The Mining Journal

Established 1835 — Railway & Commercial Gazette

Vol. CCXLIII No. 6207 — LONDON, AUGUST 6, 1954 — PRICE 8d.

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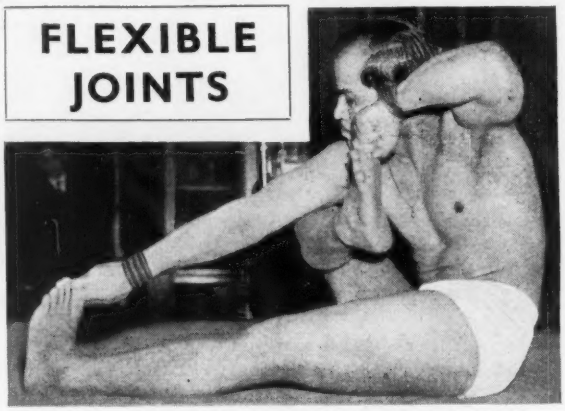

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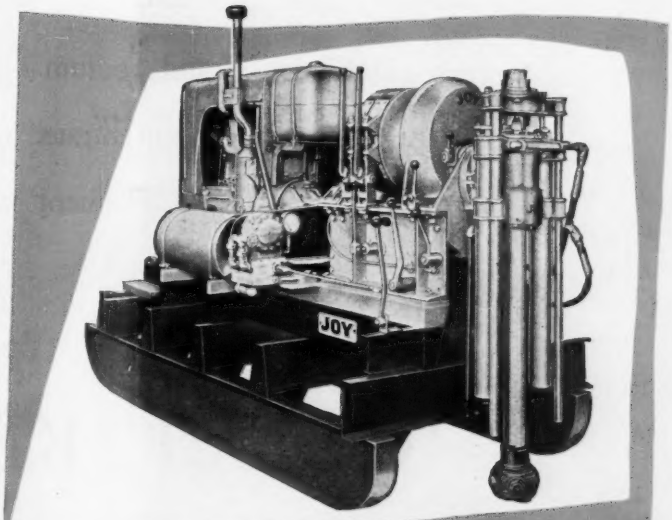

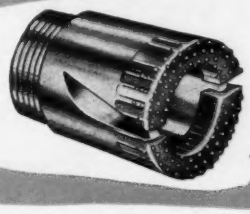

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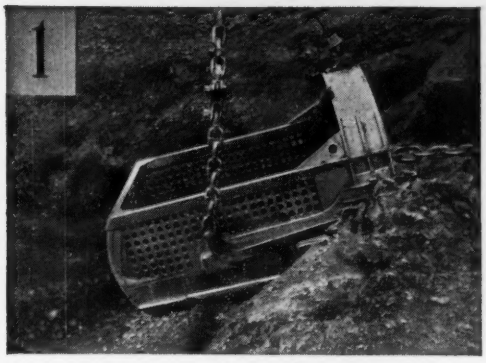

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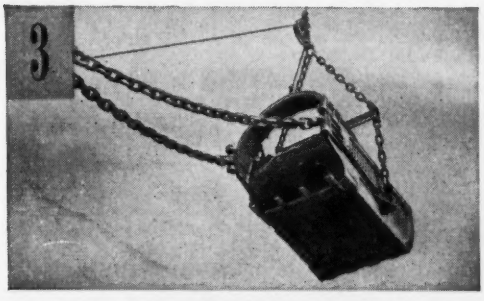

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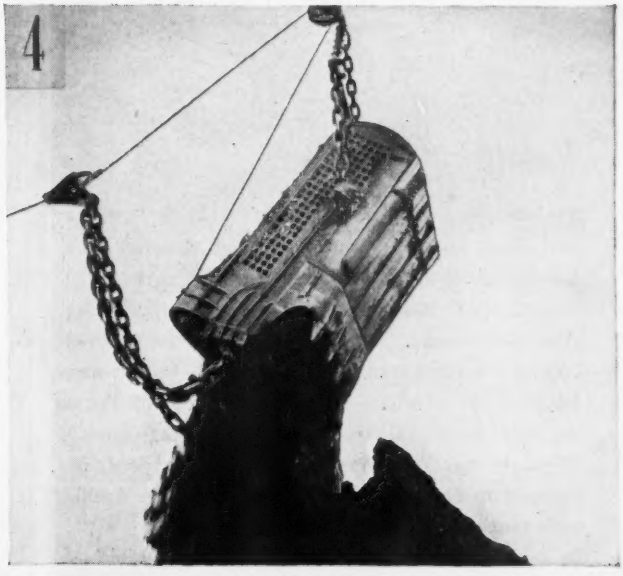

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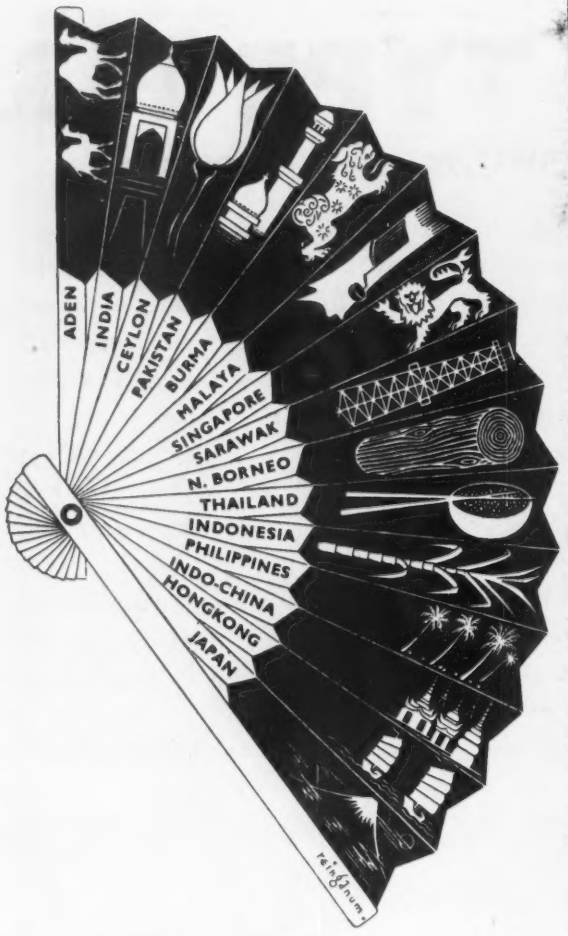

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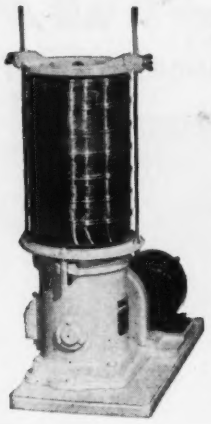

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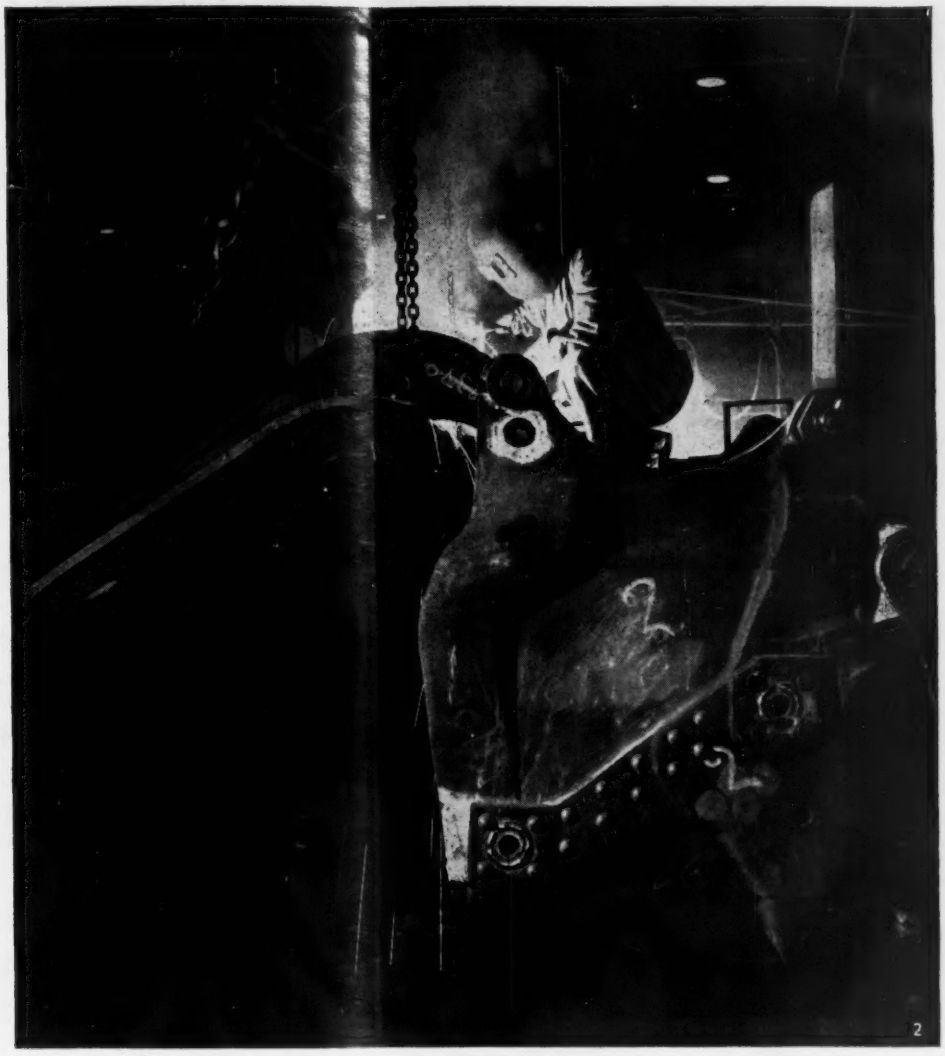

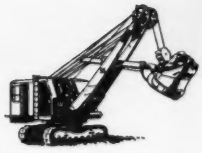

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The Mining Journal

Established 1835

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NOTES AND COMMENTS

First Aluminium Ingot Poured at Kitimat

The first aluminium ingot was poured on Wednesday of this week at Kitimat, British Columbia, marking the completion of the first stage of the giant $275,000,000 hydro-electric and aluminium smelter project constructed by the Aluminium Company of Canada Limited (Alcan) on the Pacific coastline of Canada after three years and three months construction work.

The first stage of the project now in operation uses hydro-electric capacity amounting to 420,000 h.p. and will produce 91,500 tons of aluminium annually. Yet this is only the initial production figure and the hydro-electric works, transmission lines, and the smelter site are capable of rapid expansion by the installation of additional generators and smelter potlines when conditions warrant.

The progress of this vast project has been closely followed in the pages of *The Mining Journal*, but it seems well worth while recalling some facts and figures if only to place this important new source of aluminium in its proper perspective. For example, by October, 1952, more than 6,000,000 tons of rock and clay had been moved into the canyon of the Nechako River to form the Kenney Dam, the third largest earth-filled dam in the world—see the *M.J.*, October 17, 1952, page 430. This man-made mountain backs up the waters in a lake and river reservoir system 150 miles in length. One of the most difficult stages in the construction work was the task of driving a 10 mile tunnel, 25 ft. in diameter, leading to the impounded waters through the barriers of the coastal mountains. This was effected by drilling teams driving in opposite directions, the junction being made inside the mountain last December. The Kemano power house, a huge cavern one quarter mile inside the mountain, houses three 140,000 h.p. turbines, which started to turn over on July 15 last, driven by the waters falling 2,600 ft. through penstocks from the tunnel above, and thus for the past three weeks power has been passing through the 50 mile aluminium transmission line which crosses a 5,000 ft. mountain pass between Kemano and Kitimat to "bake" the "pots" in the aluminium smelter.

Meanwhile, the newly built seaport at Kitimat adjacent to the smelter has been steadily receiving a flow of raw materials consumed in the smelter. The company's own shops are operating on a regular schedule bringing alumina from Jamaica (via the Panama Canal) where another of Alcan's subsidiaries is extracting refined alumina from the bauxite.

The successful completion of the Kitimat smelter brings the company's present production of aluminium in Canada to about 550,000 tons per annum, or approximately one quarter of the world's supply. About 85 per cent of this production is shipped to world markets, the greatest proportion being absorbed by the United States and Britain. First shipments of primary aluminium ingot will leave Kitimat shortly, thereby bringing into play a new source of vital aluminium for North America and the free world.

Expansion of West Germany's Mining Machinery Exports

West German makers of mining machinery and equipment were able to gain a firm footing in many important overseas markets during the last two years and the Federal German Republic's surplus of exports over imports in this important sector of her machinery industry totalled last year no less than 317,000,000 D.M., an increase of 55,000,000 D.M. over 1952.

While the value of imports of mining machinery and equipment rose from roundly 15,000,000 D.M. in 1952 to 21,700,000 D.M. in 1953, the value of exports leapt from 277,000,000 to 338,800,000 D.M. Belgium, Holland, the U.K. and Chile, in this order, were the main markets for heavy mining machinery, followed by Turkey, the Saar, France and Japan. Total value of exports of this type of machinery aggregated 48,378,000 D.M. in 1953, against 51,783,000 in 1952. As regards other mining machinery and apparatus (this group includes drilling equipment) the U.K. was the chief buyer, taking goods worth 11,394,000 D.M., followed by Holland (9,563,000) and Brazil (9,361,000), while Australia, Yugoslavia, the Saar, Sweden, Turkey and France imported equipment valued at more than 5,000,000 D.M. in each case. Total shipments of this class of mining machinery were valued at 131,745,000 D.M. (97,061,000 in 1952) while the quantity amounted to 30,178,000 kilos (23,002,000). As regards equipment used in the processing of ores, e.g. screening, sorting and washing machinery, the total value shipped was 151,946,000 D.M. (121,706,000 in 1952), while the weight aggregated 43,033,000 (43,282,000) kilos. This country was again the leading importer, taking equipment worth 23,735,000 D.M., weighing 8,020,000 kilos. Yugoslavia, Italy, Belgium, Holland and Sweden (in this order) were the next best buyers. However, it would be wrong to assume that West Germany is selling mining equipment chiefly to European countries and to industrially highly developed overseas countries; on the contrary, the

appearance of Afghanistan, Aden, Kuwait, Madagascar, the Belgian Congo, Portuguese West Africa, Ecuador, Peru, Bolivia, Costa Rica, Salvador, Poland and Rumania, illustrates in a striking manner that West German makers of mining machinery and equipment have indeed made a world-wide effort at recapturing foreign markets.

To complete this account, reference must be made of the fact that Western Germany's export of hydraulic mining equipment is also on the upgrade, having totalled last year 6,820,000 D.M. (6,605,000 in 1952), the weight of exports being 376,000 kilos (399,000). The chief buyers were Holland, the Saar, Switzerland, and Italy, in this order.

A New Maintenance Order

The Iron and Steel Board is no longer without visible means of subsistence. A maintenance order has been issued by the Minister of Supply which conforms precisely with the terms of Sir Archibald Forbes's application filed two months ago. It provides that producers of heavy steel ingots, and all grades of blast furnace pig iron except basic quality, shall pay into a central fund levies of 4½d. and 4d. per ton respectively. Calculated on the basis of current production these levies are estimated to yield an annual income of £377,000 which should be sufficient to finance the operations of the Board without recourse to State aid.

The levy system is not an original idea. It is in fact a slavish copy of the Steel Industry Fund which was established some years ago to equate the prices of foreign and domestic supplies of iron ore, pig iron, ferrous scrap, and steel series. The extra cost of imported supplies is paid out of the Fund, and the necessary finance is provided by a general levy on all home produced iron and steel. During the period of the steel shortage, the swollen volume of imports imposed a heavy drain upon the Fund which was plunged into a serious deficit.

But conditions have now changed. In the first half of this year arrivals of foreign iron and steel were reduced to less than half the imports in the first six months of 1953. Prices have also fallen and the Fund is probably now "out of the red." It is a possibility that the original levy can be reduced to offset the extra charges imposed on the industry under the new Order which became operative on August 1.

Mines and Quarries Report for 1952

The Report of H.M. Inspectors of Mines and Quarries for the year 1952, published on July 27, this year, points out that an average of 62,038 persons were employed at quarries in that year, which figure includes a force of 8,360 employed at open-cast coal workings. Output of mineral amounted to 160,385,200 tons, which in turn includes 12,167,100 tons of coal and 226,500 tons of fireclay produced at open-cast coal sites. Total output of mineral gave an average of 1,482 tons *per capita*.

Mechanization of quarries and open-cast sites continued through the year, but is reported to have introduced in its wake a new set of circumstances and hazards which are not always appreciated by workers or management. These particular problems involve the increasingly wide use of portable machines of all types, such as excavators, cranes, bulldozers and the like, which demand extra care by operators. The wider use of electricity tends to elminate the necessity for countershafts and the long drives often associated with them and makes easier the fencing of the machinery.

The report is concise and clear, yet it is a pity that the information must be delayed some eighteen months before being made available.

The Rhodesias

(From Our Own Correspondent)

Salisbury, July 23.

In his Budget statement, made at the end of last month, the Federal Minister of Finance, Mr. Macintyre, after quoting figures relating to the balance of payments, exports and internal economy, said the figures illustrated the value to the Federation of the copper industry. They also illustrated, he said, the need to widen the basis of the Federation's economy.

Later, when he replied to the debate on the Budget, the Minister said that the suggestion that an additional shilling tax be levied on copper-mining profits was discriminatory, dangerous and undesirable. "I am not even prepared to consider it," he said. In reply to an African member's question on the distribution of copper-mining profits, Mr. Macintyre said he believed the country had nothing to complain about in the way the copper mines invested their money in the territory. "We have reason to feel they have treated us well," he said.

The French engineering consultants from Electricité de France, who are to decide which power scheme—Kariba or Kafue—is to be started first, this month had discussions with members of the Federal Electric Board in Lusaka.

When he announced the Government's decision to seek the advice of the consultants, the Prime Minister, Sir Godfrey Huggins, said that it was not for the Government to consider emotional factors but to make certain their actions were based solely on the best technical advice, and what was economically most desirable for the Federation as a whole, not forgetting the "vital interest" of the copper industry.

The discovery of germanium and lithium in Northern Rhodesia was announced in the Legislative Council this month. It is apparently too early, however, to indicate how important the discoveries will prove. Germanium has been identified by the Geological Survey Department in copper ores at the Sable Antelope mine at Mumbwa, and two types of lithium have been found in the Choma district.

The managing director of Rhodesian Vanadium Corporation, Mr. C. A. Bott, stated this month that unless Rhodesia Railways allocate more trucks for the transport of chrome ore from Southern Rhodesia to the east coast port of Beira, seven mines would "go broke" within six weeks. Mr. Bott said that since just before the recent railway strike, his companies' allocation of trucks had been cut so that only one-tenth of the normal quantity of ore was being carried.

The general manager of Rhodesian Chrome Mines, Mr. G. H. Parkinson, however, says that it is "merely a seasonal fluctuation" which has been responsible for fewer trucks being made available for the carriage of chrome. Beira port and railway officials have said that there is no restriction on the movement of chrome. Port storage dumps are reported to be higher than normal, but there is no shortage of space.

The chairman of the Southern Rhodesia Natural Resources Board said in Salisbury this month that reserves of high-grade coking coal at Wankie—the only known major source of such coal in Central and South Africa—were by no means inexhaustible. He said many people believed the Colony's coal reserves were inexhaustible, but they failed to distinguish between high-grade coking coal, confined so far as is known to the Wankie area, and the lower-grade material which occurs in certain scattered areas of Southern Rhodesia.

The Rôle of Southern Rhodesia's Steel Industry in Rhodesian Mining

The relationship between the young and expanding steel industry of Southern Rhodesia to that of the development of the mining industry in Central Africa is sometimes taken more for granted than discussed and appreciated. The following article traces the history of Southern Rhodesia's steel industry, describes the plant in use, and methods of extracting the iron ore, against the general background of the mining and industrial development in the two Rhodesias.

The steel industry in Southern Rhodesia originated shortly before the war, when a well equipped steel works came into production at Bulawayo. This enterprise was inaugurated in May, 1937, by Mr. Ronald Paget, a Johannesburg business man who became chairman of the Rhodesian Iron and Steelworks Corporation. Closely associated with the venture was Dr. J. H. van der Bijl, late chairman of the South African Iron and Steel Corporation. The official opening ceremony was performed on March 18, 1939, by His Excellency the Governor of Southern Rhodesia, Sir Herbert Stanley, G.C.M.G.

The original intention was to produce only shingled iron, which would be rolled into bars. The formation of the company was more or less coincident, however, with the expansion of the Rhodesian gold mining industry and also with the development of the Copperbelt mines, while the demand for good quality iron and steel was further stimulated by rearmament. It was decided, therefore, to install an electric furnace of the Herault type to produce high-class electric steel of all qualities. So successful was the Bulawayo undertaking that its scope was subsequently extended by the provision of a steel foundry for the manufacture of all classes of steel castings up to five tons in weight. By 1941 the Corporation was producing a large proportion of the Colony's requirements for castings, as well as all rolled sections small enough to come within the scope of the works. Among the articles in regular production were tube mill liners, shoes and dies, forged steel balls from 2½ in. to 5 in. dia., and a variety of mining and engineering requirements.

The principal customers were the mining industries of Southern Rhodesia and the Copperbelt. By keeping the mines supplied with such essential items as steel angles, when they ceased to be available from overseas, the Corporation played an indispensable part in the war-time economies of the Rhodesias.

ORIGINS OF THE QUE QUE WORKS

At that period no steel was produced in Southern Rhodesia from domestic ores, the main processes at the Bulawayo works being the melting and refining of scraps. In 1940 it became obvious that a shortage of scrap would arise. About that period Captain F. E. Harris, then Minister of Supply and Mr. G. Musgrave, visited India and Australia on Eastern Group Supply business. On their return Musgrave wrote a report on the production of steel from local ores, on which document the Que Que works was founded.

The Government was then negotiating for the production of steel from Que Que ore, its intention being that this service to the Colony should be undertaken by private enterprise. The safeguards required by the company proved unacceptable, however, and it was therefore agreed that the steel industry should be taken over by the State. The Rhodesian Iron and Steel Commission was formed for this purpose, its first chairman being Mr. G. Musgrave. Besides acquiring the Bulawayo works, it purchased iron and limestone deposits near Que Que, together with about 2,100 acres of land. The Commission is now the Colony's sole steel producer.

The Que Que steelworks was opened by the Prime Minister, Sir Godfrey Huggins, in April, 1948. The plant consists of iron ore and limestone mines, ore crushing and screening plant and stockyard, two blast furnaces (including the one recently commissioned), one 25-ton open hearth, a 21 in. mill and a 12 in./10 in. mill. At Bulawayo the Commission has a 4-ton electric furnace, one 500 lb. and one 1,000 lb. induction furnace, a steel foundry, a rolling mill section consisting of two steam-driven mills, one 10 in. and one 12 in., and a drop forging plant.

Output figures for the Commission's first four years of operation are as follows:

	Pig iron (*s.tons*)	*Steel Ingots* (*s.tons*)	
		Que Que	*Bulawayo*
1948	18,406	5,789	3,174
1949	30,540	16,690	3,741
1950	37,467	20,057	4,223
1951	35,438	24,494	4,766

Like the South African Iron and Steel Corporation, Riscom experienced considerable teething troubles. A net loss of £20,635 was made in 1948 and further losses were incurred in subsequent years. In 1951, however, the net loss on general revenue and expenditure account was only £6,078, profits of £18,974 from the Bulawayo works and £5,482 from the Que Que limeworks being offset by a loss of £30,534 incurred by the Que Que iron and steel works. Nevertheless, the accounts for 1951 showed a definite improvement over previous years, due to larger production, better operation and a rise in the selling prices of the products.

Still more encouraging were the results for 1952, when the year's operations resulted in a profit of £189,456 before charging interest payable to the Government. In that year Riscom produced more than 42,000 tons of pig iron and 32,000 tons of steel. In addition, its works supplied 75 per cent of the Colony's burnt lime production. Complete statistics for 1953 are not available at the time of writing, but it is noteworthy that in November steel dispatches from Que Que reached the record total of 2,700 tons, the previous "best" having been 2,300 tons in May, 1952. On December 31, 1952, 548 Europeans and 2,384 Africans were employed by the Commission at its various works.

LOW COST PRODUCER

The Iron and Steel Act directs that the Commission should produce steel at a reasonable price in order that secondary industries may be encouraged. In 1951 the prices of steel sections ranged between £43 and £45 10s. per ton. As a result of wage increases and increases in the prices of coal and coke early in 1952, the prices of rolled steel sections and pig irons were raised by £4 5s. and £1 per ton on March, 1952. This step met with an unfavourable reception from consumers and in July last year the Secretary of Trade and Industrial Development announced that sales had dropped by 25 per cent, making it necessary for a number of employees at the Que Que works to be laid off. A reduction of £4 5s. per ton, equivalent to about 10 per cent, was announced the following month.

A policy of increasing production as a means of reducing

costs has been advocated for several years. At an early stage the Commission consulted John Miles and Partners (London), Ltd., who made recommendations for the improvement of operations and an increase of finished steel products. In May, 1949, they advised that an efficient unit to produce at prices comparable with those prevailing in the Union should be on a basis of 109,000 tons of rolled products a year.

The consultants made a survey of the manufacturing costs of pig iron in all the more important iron and steel countries and found that the cheapness of the raw materials delivered to Que Que was unrivalled. The cost per l.ton of ore at the furnace amounted to 8s., compared with 17s. in South Africa, 7s.-60s. in Britain, 30s.-55s. in the U.S., and 30s.-70s. in Belgium. Since Southern Rhodesia is exceptionally well situated in this respect, the principal factors to be considered when assessing the scope for expansion are the extent of resources and market demand.

QUE QUE'S IRON ORE DEPOSITS

The haematite deposits owned by the Commission at Que Que occur on two adjacent hills and are among the richest in the world, the grade ranging from 50 per cent to 60 per cent Fe. Diamond drilling and underground exploratory work have been actively prosecuted, but the former was discontinued at the end of 1952. The ore reserves then stood at 16,062,000 tons of proved ore and 67,850,000 tons of probable and possible ore.

The quality of iron ore, mainly from the silica point of view, is particularly important for steel production. The consultants formed the opinion that difficulties were being caused by the extreme variability of the Que Que ore. The following typical figures indicate the variations over relatively short distance encountered in samples obtained on a 10 ft. x 9 in. groove.

Fe		SiO_2	
49.02	65.50	17.50	4.60
58.71	40.47	9.00	22.00
59.56	63.87	9.30	5.80

In large modern plants which use variable ores, uniformity is provided by means of a bedding plant. Essentially, this consists of equipment which spreads the ore in long, thin layers and reclaims the ore in cross section. The capital cost of such a unit was regarded as prohibitive for a steel works the size of that at Que Que. The consulting engineers formed the opinion, however, that by changing the methods of mining, together with other changes at the blast furnace, the variations in iron ore could be largely overcome. They therefore proposed that the existing method of underground mining should be replaced by open-cast mining along a large face. Some open-cast mining was already being carried out on the west side of North Hill; it was recommended that this face should be extended to the east side of this hill, and that it should be worked by mining the whole face and loading across it.

No difficulty in connection with the existing ore traffic was presented by this proposal. It was pointed out that for hand labour the existing loading bin system could be maintained, these bins being filled from the small hand-propelled bogies. If loading were mechanized, there was no reason why the existing level of mining should not be dropped to the main line level, so that direct loading could be carried out from the digger into the works' wagons. Emphasizing the desirability of mechanized loading in the open-cast mine, having regard to the inefficiency of African labour and its high cost, the consulting engineers recommended the purchase of two mechanical diggers, each with a .675 cu. yd. bucket.

During the wet season ore becomes very sticky and unscreenable on the ¼ in. screen. In view of the relatively small annual requirements, even for maximum output of the blast furnace, it was therefore decided that mining should be carried out only during the dry season.

Recent development has consisted in the preparation of a new face to which the overlying country rock could be broken. This has been done in preparation for opencast mining by mechanized methods of the increased quantities of ore which will be required. In 1952 181,884 tons of iron ore were mined at Que Que, as well as 80,909 tons of limestone.

OTHER IRON ORE DEPOSITS

Riscom has an exclusive prospecting reservation covering the Manesi iron ore deposits, 60 miles east of Que Que. These comprise banded haematite-jaspilites and contain very large quantities of low-grade ore (40-45 per cent Fe). There are also some bodies of high-grade haematite associated with zones of faulting and brecciation. Due to transport difficulties no drilling has yet been undertaken. Other iron ore deposits occur in the Lower Sabi Valley. In this area, which is still unmined, possible reserves are stated to be approximately 53,000,000 tons, of which 14,000,000 tons are high-grade.

Originally the dolomite required for the furnace bottom and for fettling purposes was obtained from local limestone and magnesium quarries, the mined cost being 4s. 3d. per ton. Que Que limestone is of high quality, but the dolomite is too low in magnesium oxide to be considered a suitable raw material for the production of burnt dolomite for refractory purposes, though very suitable for use in blast furnaces to produce slags of the required viscosity.

Up to the present no suitable dolomite for refractory purposes has been located in Southern Rhodesia, the material available being either too high in silica or too low in magnesium oxide. Riscom have been working a deposit in the Sinoia region, but this material is very variable in regard to silica content and contains a considerable amount of free quartz. Efforts have been made to separate out the most siliceous materials, but this is a job requiring experience and skill. From the information available, it seems possible that fairly high grade dolomite may be obtainable from the Sinoia area. Meanwhile the steelworks are using dolomite purchased from the Union. The quantities involved per annum are relatively small.

Abundant water is available, the principal supply both for Riscom works and for Que Que town being derived from the Cactus Poort Dam, which is capable of yielding 33,000,000 gallons per month. With a view to meeting the increasing requirements of the steel works, a dam across the Sebakwe river is being constructed.

COAL AND COKE FROM WANKIE

Electric power for the industrial development of the Midlands is available from the Rhodesian Electricity Supply Commission's generating station at Umniati. To meet the future demand for electricity, this new machanized power station can be expanded to six times its present capacity. It has been authoritatively stated, however, that only by some large hydro-electric scheme can cheap power be produced in Southern Rhodesia. Two schemes for providing the Rhodesias with low-cost power for future expansion have been put forward. The larger project involves harnessing the Zambesi at Kariba Gorge to generate 385,000 kW. in the first stage and ultimately 1,000,000 kW. The other scheme is a smaller one for harnessing the Kafue River, which envisages two power stations of equal capacity with an estimated 257,000 kW. at 80 per cent load factor.

Coal and coke are derived from Wankie Colliery where an expansion programme expected to cost approximately £5,300,000 will increase production to 5,000,000 s.tons annually from the present level of about 2,750,000 tons.

Consideration has been given to the economics of producing coke at Que Que. Assuming a pig iron production of 30,000 tons per annum and a coke production of 50,000 tons, the cost of a complete plant (including coal handling, coal preparation, ovens and by-product plant) was estimated to be £950,000. Based on a coal price of 21s. 3d. per ton delivered Que Que, it was concluded that the manufacturing cost of coke would be approximtely 40s. and the total cost (adding 8 per cent for interest and depreciation) approximately 70s. With a delivered price of 52s. 6d. per ton for Wankie coke, giving a final figure of approximately 60s. per ton for blast furnace coke, the erection of a coke oven battery would not be economic. If production at Que Que were increased to 100,000 tons per annum, however, the manufacturing cost of coke would be reduced to 34s., the cost of coke oven plant would only be £100,000 higher, and the total cost of coke would be 50s.

ESTIMATED DEMAND

An estimate of the existing demand for steel indicated a total of 109,000 tons per year of rolled products, rising in four or five years to about 150,000 tons per year. This estimate covers a wide range of products, but those necessitating the installation of large-scale rolling mills were not regarded as justified on the short-term indications of demand. On the other hand, about 62 per cent of total demand is required in the form of medium and light sections, bars and rods, which lie within the range of sizes capable of being produced by the two mills already installed at Que Que.

A programme for the better utilization of equipment involved modifications to the existing 21 in. mill and in the finishing department in order to raise the production of rolled products from just over 2,000 tons to about 4,600 tons per month, the cost of these improvements being estimated at £100,000. Approval was also given for the expenditure of £600,000 on a new melting shop and a 75-ton open hearth furnace, the aim being to raise the output of ingots from just over 24,500 tons annually to about 65,000 tons per year.

The programme also envisaged the installation of a blast furnace and certain other items in order to bring pig iron production into line with the capacity of the extended steel plant. These improvements were expected to cost £250,000 and were designed to raise the output of pig iron to between 75,000 and 80,000 tons a year, of which 65,000 tons would be required for steelmaking, leaving a balance of 10,000 to 15,000 tons available for sale or export. A quotation for the proposed blast furnace was obtained from a reputable firm of engineers, but the figure proved higher than Riscom could afford. An investigation was then made to determine whether the Commission could build its own blast furnace and an estimate was submitted to the board. In May, 1952, the board decided to build the furnace. This was the largest engineering project attempted in Southern Rhodesia, every item of the plant being manufactured locally with the exception of three items. The job has been done at 40 per cent less than the overseas estimate.

Shipments of foundry pig iron have already been sent to the United States, where the domestic price is about £20 a ton compared with Southern Rhodesia's home price of £12 3s. 9d. a ton.

The projected improvements were expected to provide for 62 per cent of the country's overall requirements of iron and steel products for the next few years. It was anticipated that with the new scale of operations the production cost per ingot would be reduced to about 271s. compared with 372s. in April, 1952, and that the Que Que works would then be on a sound financial basis.

LONG-TERM PROGRAMME

Plans for a long-term programme of expansion envisage, *inter alia*, an increase in the production of pig iron to about 150,000 tons per year for steelmaking, plus the demand for sale iron, and the installation of further equipment to provide for an output of 150,000 tons of ingots. The finished products would comprise a full range of light and medium sections, bars, sheets and billets totalling 115/120,000 tons a year. Production would then be approximately equal to the estimated demand for these products in a few years' time. The capital expenditure involved has been estimated roughly, at the 1952 level of prices, at about £6,000,000. This figure makes no provision for a coke oven plant at Que Que, for which a further £2,000,000 would be required. An annual profit of about £2,500,000 is anticipated from the completed scheme.

This programme seems by no means unduly ambitious, having regard to the tempo of mining and industrial development in the Rhodesias. The total value of all mineral production in Northern Rhodesia rose last year to £95,000,000, compared with £72,000,000 in 1951 and £35,500,000 in 1949. In view of the expansion programmes still proceeding in the Copperbelt and with Chibuluma and Bancroft scheduled for production in the near future, it is reasonable to anticipate a very large increase in the Federation's total rquirements of steel and steel products.

Demand wil lbe further stimulated by the immense power projects now under consideration for the Rhodesias and by the development of secondary industries. Not only is Riscom supplying the mines of Southern Rhodesia and the Coperbelt directly with steel sections, light rails, galvanized sheet, light plate, steel castings, etc., but it is also assisting them indirectly by making possible the development of further industries based on these materials. One of the first developments arising from the establishment of the Commission was the opening of a steel tube works by Stewarts and Lloyd of South Africa Ltd. Another new enterprise made possible by the existence of an expanding steel industry was that of Rhodesian Alloys Ltd., a company with an authorized capital of £1,000,000, which was formed primarily to produce ferrochrome from ores from the Midlands district.

In the early days of the South African steel industry, the late Dr. H. J. van der Bijl was sometimes accused of planning on too large a scale. Yet the demand for steel in the Union has consistently outpaced the expansion of production. It may well be that Riscom, too, will find their most sanguine expectations fall far short of the future requirements of the Federation.

The benefits to the mining industry of Riscom's programme of expansion will be two-fold. In the first place, further opportunities will be presented for processing local ores in the country, thus providing producers wtih some degree of protection against fluctuations in world demand. Secondly, it is highly undesirable for security reasons that a key industry such as mining should remain critically dependent on importation, particularly when many essential requirement are obtained from overseas.

The Commission has not yet reached smooth waters, for a financial crisis due to over-spending of capital led recently to an enquiry into its administrative control. There can be no doubt, however, that Southern Rhodesia's young steel industry is already making a contribution of far-reaching importance to the prosperity and security of Rhodesian mineral producers, which will become increasingly valuable as time goes on.

RARE EARTHS—III

Rare Earth Metals—Their Properties and Applications

In the following article, the third in a series concerning the nature, mining and treatment of rare earths, or lanthanons, the properties of and market applications for the rare earth metals constitutes the principal theme. Thorium and its compounds are discussed in this context, as is "mischmetal," and the article concludes with an assessment of the future outlook for thorium and the rare earths which appears to be assured. In our issues of July 23 and July 30 The Mining and Treatment of Rare Earths and The Mining and Treatment of Rare Earths in Australia were described respectively.

Thorium has been produced for many years in the form of a dark grey powder with a specific gravity of 11.5, which melts at 1,850 deg. C. It combines readily with oxygen, hydrogen and nitrogen and dissolves in aqua regia, but with difficulty in other acids. Pure thorium has recently been produced in the United States in massive form. It is very soft and ductile, is easily formed, and has practically the same specific gravity as lead. In other respects, however, it more closely resembles the IIIB group of elements—titanium, zirconium and hafnium. It is unattacked by alkalis or concentrated nitric acid and alloys readily with a number of metals. Too little of the massive metal has been produced for possible uses to be adequately explored, but it is possible that the unusual combination of softness, high melting point and resistance to alkalis might lead to applications.

Thorium's largest field of usage is in the form of the nitrate for the production of incandescent gas mantles, which before burning off consist of a woven fabric of suitable material, impregnated with a mixture of the nitrates of thorium and cerium, together with small quantities of hardening salts. After burning off, the ash skeleton contains about 99 per cent of thoria and 1 per cent of ceria.

Thoria is an important constituent of the catalyst used in the Fischer-Tropsch process for converting coal into oil. It is also employed as a catalyst in the oxidation of ammonia to nitric acid, carbon dioxide to carbon monoxide, and sulphur dioxide. Because of its melting point of 2,470 deg. C. and its high resistance to most acids, it also has possibilities as a refractory for many purposes, but this is not a large field of usage.

The use of thoria in electrical resistance wire to prolong life at high temperatures has been a notable discovery. An older but equally important application is its addition to tungsten lamp filament wire, which greatly increases the ductility of the wire. The use of thorium or thoria for the prevention of grain growth at grain boundaries is being tried or considered wherever this problem arises.

THORIUM AND ITS COMPOUNDS

Considerable work has been done on the use of thorium as a minor alloying constituent with other metals. Additions to steel have proved moderately successful, but the development of this application has been limited by the high price and, at times, unavailability, of thorium. Small additions to aluminium are said to increase corrosion resistance, while the addition of about 3 per cent of thorium to magnesium alloys gives increased room-temperature tensile properties, accompanied by a significant increase in creep strength at elevated temperatures. It is considered that an assured supply would undoubtedly lead to the development of new metallurgical applications.

In 1950 the quantity of thorium dioxide used in the United States for non-atomic energy purposes amounted to 52,711 lb., of which 91.8 per cent was used in incandescent gas mantles, 3.5 per cent for refractories and polishing, 3.9 per cent for chemical and medicinal purposes, and .8 per cent for electrical uses.

As found in nature, the element thorium consists of an isotope of weight 232. It is not in itself a valuable element for use in atomic piles, but when subjected to bombardment by neutrons it forms a heavier isotope of weight 233, which, after emitting an electron, turns into an isotope of uranium U233. Since this form of uranium is fissile, it is possible that thorium might provide a nuclear fuel. It has been suggested that it might be possible to produce more atoms of U233 than the number of atoms destroyed in producing the neutrons. If so, it would obviously be economical to use existing stocks of U235 to make U233 from thorium.

MESOTHORIUM AND THE CERIUM SUB-GROUP

Mesothorium does not itself emit radioactive rays and requires to be "ripened" for several months before its production of alpha rays is sufficiently strong to permit its use for luminous paints. For this application it is about 30 times as powerful as radium, but its useful life is only about six years compared with 1,600 years for radium. The production of beta and gamma radiations develops quite rapidly and these are used in the treatment of some types of cancer and skin diseases. Because of their powerful ionizing properties both mesothorium and radiothorium are used for dissipating charges of static electricity which may accumulate on machinery.

The largest uses for the cerium sub-group of rare earths are in electric arc carbons for cinema projectors and searchlights, and in the metallic form in lighter flints. The inclusion of certain salts of the rare earth group in the core of negative electric arc carbons causes the latter to burn more easily and without noise, while giving an intense light. For this purpose the fluorides are commonly employed. According to Sydney J. Johnstone, the consumption of cerium earth fluorides in Britain for this purpose is probably equivalent to about 800 l.tons of monazite a year.[2]

"MISCHMETAL"

The term "mischmetal" is applied to the mixture of rare earth metals obtained by the reduction of the oxides produced from monazite after the removal of the thorium. It is obtained by electrolysis of the impure chlorides and consists broadly of 50 per cent cerium, 46.5 per cent lanthanum and other members of the cerium sub-group, 2 per cent of yttrium and members of its sub-group, and not more than 1.5 per cent of impurities. Before the second world war the principal producers were Austria, Germany and the United States, but during the war Britain embarked upon the production of mischmetal on a large scale.

Because of its very marked pyrophoric properties mischmetal, alloyed with metallic iron, is extensively used in the manufacture of lighter flints and also in star shells and tracer bullets. In recent years much work has been carried out to determine the value of small additions of the cerium metals to a variety of ferrous and non-ferrous alloys. Added to cast iron, mischmetal reduces sulphur content, acts as a carbide stabilizer, and produces a nodular graphite structure. A process developed by the British Cast Iron

Research Association gives a cast iron having a nodular graphitic structure in the "as cast" state, thus avoiding the lengthy heat treatment involved in the production of malleable cast iron by the usual process. Mischmetal improves the forgeability of stainless steels and may play an important part in decreasing the brittleness of steel at low temperatures. Magnesium-cerium-zirconium alloys possess good casting qualities and resistance to "creep" up to 200 deg. C., which make them suitable for lightweight stressed parts in aero engines. Aluminium alloys containing about .15 per cent of cerium also have improved high temperature properties. It has been shown that the addition of .2-.5 per cent of mischmetal to aluminium or magnesium gives improved grain structure, higher tensile strength, and increased hardness. Used in the aluminium bath, rare earths give attractive hot dip coatings.[2]

Mixed rare earths have been used in Germany to polish optical glass, the time required being about 60 per cent of that taken when rouge was employed. Commercially pure cerium oxide is now being used for polishing glass at several works in Britain, Canada and the United States. It is claimed to be about three times faster in polishing than rouge, besides giving a more brilliant finish and greater freedom from burns, scratches and other blemishes in the finished glass. Cerium oxide and mixed rare earths are reported to be good substitutes for scarce selenium in decolouring glass, a disadvantage being their higher cost.

Chlorides or acetates of the mixed rare earths are used in the United States as water-proofing agents and fungicides in textile manufacture. Small quantities of various mixed salts are used in medicine.

Some of the more uncommon rare earths have special applications. Neodymium gives an amethyst colour to glass. Samarium and europium are used as activators for infra-red phosphors. Didymium enters into the manufacture of electronic apparatus, while lanthanum oxide is the principal constituent of glass lenses with a high refractive dispersion suitable for aerial cameras. Having the highest neutron-absorption cross-section of any element, gadolinium may find nuclear applications.

FUTURE OUTLOOK

In assessing the future outlook for thorium and the rare earths, the authors of the Paley report point out that, because of the high prices of these materials, waste in processing monazite and preparing end uses is held to a minimum. It is possible, however, that there may be waste in using a group of metals as mischmetal, where only one or two constituents are required. The tendency in future will probably be to split the rare earths into individual components, or at least smaller groups, and use each where it does the most good. An example is the use of didymium in place of mischmetal as an addition to magnesium. A significant improvement in room properties is thus obtained, while economies in the use of other rare earth constituents are effected.

SEPARATION DIFFICULTIES LIMIT EXPLOITATION OF RARE EARTHS

The lag in the use of the rare earths is ascribed to separation difficulties. The traditional methods of multiple-fractional-crystallization of the salts require hundreds of recrystallizations. These are being replaced by new separation techniques by chromatography, using adsorptive alumina. Much work has also been done on the development of a method based on ion exchange, a concentrated solution of rare earths being passed through an 8 ft. column of synthetic resin material. The rare earth ions, which are differentially absorbed by the resin, are eluted with buffered citric acid solution.

Most of the uses of the rare earths were developed because of the unique properties of these metals and substitution is not easy. On the other hand, the more extensive production of monazite and other rare earth minerals, together with the development of improved separation processes, should result in greater availability, more efficient utilization, and lower prices. This should assist in extending the range of non-nuclear applications, while it is also possible that thorium might become one of the important raw materials for atomic power generation. A strong demand for thorium and the rare earths appears to be assured.

REFERENCES

[2] *Minerals for the Chemical and Allied Industries*, p. 532.
[3] Office of Technical Services, Washington (TIDU 0885/54).

Correspondence

THE DETERMINATION OF BELT LENGTH

The Editor, *The Mining Journal*.

Sir,—The formula evolved by the executive mining engineer of the Bell and Zoller Coal Company, America (see *M.J.*, June 9, page 46) for determining the length of belt in a roll is not the simplest one, which is (using the same symbols):

$$L = 1.57\ N\ (D+d)$$

Yours faithfully,

W. E. WRIGHT.

July 20, 1954.

31 Garfield Road,
Scarborough, Yorks.

STRATAMETRIC SURVEY OF BOREHOLES

The Editor, *The Mining Journal*.

Sir,—The article "Stratametric Survey of Boreholes" in *The Mining Journal* of June 18 is most interesting as illustrating the development of underground photography in limited space.

Perhaps the author's memory does not go back far enough to realize that this seems to be the adaptation of modern technique to a process that was used many, many years ago.

I think that the first attempt to survey a borehole was by lowering a bottle of hydrofluoric acid and leaving it a sufficient time for the acid to etch a ring around the inside. This gave the angle of the hole but of course did not give the direction.

Next method was to suspend a compass needle and a small plumb bob in a bottle of thin liquid gelatine and leave it in the hole until the gelatine solidified. This involved the same principles as the photographic device that you describe but it can be seen that the gelatine solution would not allow entirely free movement of the needle and plumb bob and that the photographic method would be much more accurate.

I think you published recently a description of a borehole camera which I believe represents the very latest development in this field.

Yours very truly,

LEROY A. PALMER.

July 9, 1954.

1209 South West 6th Avenue,
Portland 4, Oregon.

Helicopters in Mining Development

While the advantages of aerial transport have long been appreciated in the mining industry, the marked advances made during the last four or five years in the development of helicopters provides an appropriate background to the following short article which focuses attention on the employment of this useful type of aircraft in the mining industry.

The advantages of aerial transport have long been appreciated in the mining industry. One of the earliest and most outstanding achievements of aviation in facilitating the development of mining ventures was in the wild and inaccessible interior of New Guinea. In April, 1927, Captain E. A. Mustar made aviation history by landing a plane at the township of Wau, administrative centre of the Morobi goldfields. Within a few years Guinea Airways Ltd. became the largest aerial freight-carrying organization in the world and several other air transport companies were operating in the island. The primitive and precarious conditions in which miners existed gave place to modern townships. Dredges and other machines were conveyed to the interior by air and assembled on the spot.

The role of aircraft in mining and prospecting is now well established throughout the world. To-day, mining engineers are becoming increasingly interested in the possibilities of the helicopter, which appears to be particularly suitable for many needs. The helicopter constitutes virtually a new form of transport, which enables places to be linked without aerodromes, roads or railways, without the difficulties caused by stretches of water and, except in mountain regions, without reference to surface contours.

The Westland S-51 (three passengers and one pilot) which is eminently suitable for mining development work

Helicopters are likely to be extensively used in the mining industry, more especially in parts of the world where roads and railways are non-existent and extremely costly to construct. By solving problems of transport they might well make possible the development of many deposits hitherto left unexploited on account of inaccessibility. They might also be the means of opening up payable occurrences too limited in extent to warrant the construction of roads or aerodromes.

The helicopter is, in fact, the only vehicle which can satisfy the demands of air supply line service for exploration, survey and advanced mining development in regions where no landing strip can be made available. Its ability to rise and descend vertically, and also to hover, allows it to land in small jungle clearings and to operate in extremely broken country. It also requires fewer supporting facilities than any other type of vehicle.

Mr. Carl Agar, founder of Okanagan Helicopters of Vancouver, has conclusively demonstrated that helicopters are capable of tasks which could not be performed, or would take years to complete, with any other form of equipment. His fleet of eight helicopters has transported on to a mountain platform pre-fabricated components for a complete village of 25 houses; it has moved 13 tons of freight, consisting of mining equipment, food, living accommodation for seven men and a cookhouse, from a floating platform on a river to a mountain ridge 18 miles away and 3,000 ft. high; it has lifted 200 tons of structural materials required to dam the Palisade Lake, together with a concrete mixer and a rowing boat.

The largest engineering project for which helicopters have yet been used is Alcan's project, now well advanced, for damming a chain of lakes and transferring water by tunnel through the mountains to a massive hydro-electric station. Connection between the power house and the smelting site at Kitimat, 50 miles away, is by power lines which cross mountain ranges up to 5,000 ft. high. One of the main problems facing the engineers was to find the best route for the power lines, which might well have taken a ground survey party up to three years. In 1949, the answer was found with the aid of a helicopter in less than 30 hours' flying time. To-day, a fleet of ten helicopters is employed regularly on Alcan's scheme for transport of staff, supplies and equipment, and for survey and cable laying. Landings are often made on platforms only 14 ft. square.

Ten helicopters completed in three and a half months an Alaskan survey for the U.S. Army map service which, it was claimed, would have taken 20 years to have accomplished by any other method. By the use of a helicopter in the rugged mountain territory of the Yukon and North-West Territories, the Hudson Bay Mining and Smelting Company of Canada more than tripled the area normally prospected in one season. In western Canada Associated Helicopters of Edmonton, Alberta, completed in six weeks a geological survey which would have occupied three seasons, or 72 weeks, using the traditional pack-horse-and-canoe method. Australia is also planning prospecting operations by helicopter.

The scope for helicopters in mining and exploration will, of course, be governed by availability and economics. The type of helicopter at present flying is slow, is not yet as reliable as conventional airliners, has a high initial cost in relation to payload, and is also costly to operate. Before full use can be made of helicopters in the mining industry, these limitations will have to be overcome.

High initial cost in relation to payload may be expected to contract as size increases, while operating costs will be favourably affected by increasing size and improved reliability. There appear to be no inherent limitations to the size and capacity of helicopters. Even to-day the design of machines over 200,000 lb. in weight can be foreseen.

Since production capacity is at present much smaller than that of the United States, it is probable that some years will elapse before British helicopters of types suitable for use in mining development and prospecting become available commercially.

TECHNICAL BRIEFS

The Alloys of Beryllium

While pure beryllium metal and its oxides have established important areas of application, the most significant exploitation of beryllium to date has been in the alloy field. Small beryllium additions in magnesium and aluminium heats make far more efficient processing and improved end products. Where copper, iron or nickel is the base metal, alloy systems containing 2¼ per cent or less beryllium possess the desirable feature of hardenability. This simply means that the alloy is produced in a relatively soft state for easy forming or machining. After a part is fabricated from one of these beryllium bearing materials, it is subjected to a heating and cooling cycle which vastly improves its strength, hardness and certain other properties.

Beryllium nickel, produced in standard compositions by The Beryllium Corporation, has proved its worth in casting applications and merits the attention of materials engineers and designers. With Berylco beryllium nickel alloys, it is easy to produce cast parts which can be heat treated to excellent physical properties. Service at moderately elevated temperatures is unimpaired. Wearing qualities in existing applications are excellent. Corrosion resistance is of the type normally expected of a high nickel material since the base metal runs in excess of 96 per cent.

There are two Berylco beryllium nickel casting alloys regularly available to industry. Of these, Berylco CR-1 offers the higher physical properties, while Berylco CR-2 is supplied with lower strength but improved machineability.

Beryllium nickel is most advantageously used where design requirements call for extremely high strength and hardness (195,000 p.s.i. and Rockwell C52 minimum) combined with good corrosion resistance. Corrosion resistance compares favourably with other high-nickel alloys. These qualities have made Berylco beryllium nickel a suitable casting alloy for use in certain critical applications. For example, in the manufacture of an investment cast CR-1 alloy aircraft fuel pump impeller, Beryllium nickel was chosen for this part because of its high strength after heat treatment from the as-cast condition. A second consideration dictated the use of beryllium nickel because of its excellent wear resistance in rotating parts. The wear resistant quality of Be-Ni is again demonstrated in the use of sand cast, annealed and heat treated CR-1 or CR-2 in producing diamond core drill bits. By using Be-Ni for these bits, drillers have experienced a considerable increase in the life and efficiency of the part. The fluidity of Be-Ni in the molten state is excellent. This property has led to the use of CR-1 alloy in small, detailed investment castings. Good surfaces can be obtained by pressure casting although the selection of a suitable hob material in this method of casting is not yet fully developed.

Electrolytic Zinc Extraction

The extraction of zinc from oxidized ores has been described by Baroch and co-workers of the United States Bureau of Mines (J. Electrochem. Soc. 100, 136, 1953). The ores are leached with strong caustic soda solutions, the strength in some cases being as much as 30 per cent w/v, and the resulting zincate solutions treated with lime to remove carbonates and silicates. The solution so obtained is electrolysed to yield flake zinc. The current density should be about 13 amp. per sq. dm. and the temperature between 18 and 50 deg. For a zinc content of about 30 g./l. and the conditions as indicated, 1.5 kWh. per lb. of zinc are required.

Monitoring Air-borne Dusts

P. F. Holt and A. J. Chalk have recently described a method for determining the dust content of air (Arch. Ind. Hyg. Occup. Med. 7, 404, 1953). The air under examination is passed through a bed of naphthalene or dimethyl terephthalate at a rate of a few litres per minute. The filter medium is then removed from the holder and dissolved in acetone. The turbidity produced by the dust in suspension in the acetone is then measured by means of the nephelometer. The nephelometer may be calibrated by means of standard suspensions of silica dust.

A Radioactive Calendar

The wavelength of radioactive rays, and the rate of radioactive decay (the half life) are both so constant that measurement of length and time can be based on them. Time intervals of less than a thousandth of a second or eras millions of years long can be accurately measured by radioactivity. Research workers at Hamilton College, Canada, have made important contributions to this science of time determination recently.

Most of the reliable techniques for determining age of rocks are now based on their radioactive traces. First the half life of radioactive minerals was determined. Then the trace of these in mineral deposits was measured to find how much of their original radioactive strength had been lost. Key to this time scale is uranium which disintegrates very slowly—uranium 238 takes 50 billion years to lose half of its radioactive strength. It disintegrates to radium which decays to lead incidentally producing helium gas. By measuring the ratio of lead to uranium, or, less precisely, the ratio of uranium to helium gas, the age of a sample which contains both can be calculated. Recently the mass spectrometer has been used for this work, measuring the ratio of two lead isotopes, 206 and 210, which are both formed in uranium decay. This method has shown uranium ores from Saskatchewan mines to be 800,000,000 years old; some ores from Lake Athabaska district were shown to be 1,430,000,000 years of age.

Another of the newer techniques employs isotope carbon 14. This radio carbon dating method provides the archaeologist with a shorter standard of time measurement (carbon 14 half life is 5,600 years) as compared with the geologist's uranium time scale spanning millions of years. Using a very sensitive detector to count the low energy beta rays of carbon 14, archaeologists can determine the age of shells, ancient wood fragments or old fabrics.

Hamilton College research has examined isotope rubidium 87 which decays—in 10,000,000,000 years—to become strontium 87. The amount of strontium 87 formed in the earth's history is naturally very small, but Hamilton workers have chemically concentrated traces of it for examination. The ratio of rubidium 87 to strontium 87 found in mineral samples was measured in the mass spectrometer. They used radioactive rubidium and strontium from the Chalk River pile to standardize the mass spectrometer. This method actually measured as little as one ten millionth part of the strontium isotope. Examining several Canadian minerals for strontium 87 traces, they found biotite ore from north-eastern Saskatchewan which was some 3,500,000,000 years old.

Gold Deposition

A method for the production of thick gold deposits has been described by E. Bertorelle (Galvanotecnica 4, 141, 1953). Deposits between 12 and 46 μ were obtained in a non-porous form on brass by using a 1-10 volt A.C. supply superimposed on a 2-4 volt D.C. supply. The bath contained gold (2 g.), free potassium cyanide (5 g.), and disodium phosphate (15 g. per l.). Electrolysis was carried out at 65 deg. for between 15 and 60 minutes with vigorous stirring and periodic filtering. The ratio of anode to cathode surface was 1:5 and intermediate treatment of the surface was found to be unnecessary.

Electrochemical Production of Indium

Mills and co-workers of the Consolidated Mining and Smelting Co. of Canada have described the extraction of indium from slags containing 2.5 per cent indium (J. Electrochem. Soc. 100, 136, 1953). The slag is reduced electrothermally to produce bullion which also contains antimony, lead and tin. This is then subjected to a modified Betts electrolytic process to produce a cathodic lead-tin alloy and an anode slime containing 30 to 35 per cent indium. The slime is treated chemically to yield a crude indium metal which is subsequently refined electrolytically.

METALS, MINERALS AND ALLOYS

COPPER.—The gradual decline in copper values which has characterized recent London trading has left the American market unmoved so far. New York takes the view that the decline reflects the holiday season and offers no danger to its own price of 30 c. Indeed, C. R. Cox, President of Kennecott Copper Corporation, in submitting a review of the first six months of 1954 has forecast continuing good business in the third quarter on the basis of 30 c., and has given the strong European demand for the metal as justification for this view.

American interests are, in fact, more concerned with threats to supply rather than to any likely fall in demand. Following hard on the settlement at Chuquicamata has come the news of a strike which has been voted to start on August 18 at El Teniente. No doubt this could be settled, as was the Chuquicamata dispute, but it would be at the cost of reinforcing inflationary pressures which Chile is still incapable of controlling.

Meanwhile, the ballot on bargaining rights at the American Brass Company's Torrington plant has been won by the International Mine, Mill and Smelter Workers' Union and the way is now open—though it is not clear of difficulties and a strike has already been threatened—for the negotiation of a new contract. Other contract negotiations have been started with the Chase Brass and Copper Company and the Scovill Manufacturing Company.

Brighter news from Northern Rhodesia following the breakdown of talks on African advancement (see "Notes and Comments," July 30) is that the threat to strike at Mufulira over the dismissal of an African miner has been withdrawn.

A contract for the supply of Chilean copper (reportedly to the value of £2,500,000) to Imperial Chemical Industries has been signed. Payment will be made in transferable account sterling and delivery will be made over 18 months.

A pilot plant for the processing of local ores has been opened at Akjoujt in French Mauritania. It has a daily capacity of 10 tons.

A dispatch from Santiago reports that the Finance Committee of the Chilean Chamber of Disputes voted on August 3 for withdrawal of the Central Bank of Chile as the sole agency for copper and its replacement by a Copper Institute (recommended by the Ibanez Administration) of a Copper Corporation (recommended by the Popular Socialists). Voting on the selection of agency has been postponed but the first vote is interpreted as involving a greater degree of Government control.

LEAD.—The lead market in New York continued dull although there were some useful bids for metal for battery manufacturers who are now showing a livelier interest. There is no sign of any price movement away from 14 c.; consumer demand is inadequate to raise it and stockpile buying will prevent its fall. Shipments of refined lead January-June, 1954, to American consumers reached 255,827 tons compared with 247,123 tons in the same period of 1953. Battery manufacturers' demand was down from 42,543 to 35,317 tons, but cable makers took more at 38,346 as against 36,688 last year. June shipments reached 46,987 tons compared with 40,183 in May. Refinery stocks on June 30 stood 104,626 compared with 109,302 a month earlier and 56,569 a year earlier. Production January-June, 1954, was 279,558 tons compared with 267,507 in 1953 (American Bureau of Metal Statistics).

The G.S.A. has asked producers to offer newly mined lead for delivery before October 15.

The Spanish Ministry of Industry has fixed the selling price of foundry lead in bars for export at 9,860 pesetas a tonne; this comprises a levy for the Mining Assistance Fund of 232 pesetas and a base price of 9,628 pesetas made up of cost price a ton of foundry lead in bar 8,922.7 pesetas, founder's profit 501.3 pesetas, ore freight compensation 54 pesetas and silicosis fund 150 pesetas. The domestic selling price is fixed at 14,190 pesetas.

There have been only moderate price fluctuations on a dull American market with holiday influences tending to produce slightly lower values.

A referendum is now being held in Malaya among producers on the proposal of the French Government that the ceiling price under the International Tin Agreement be lowered from £880 to £840 a ton. The French Government had asked for the support of the United Kingdom Government in this matter before consenting to sign the agreement, and this support was given, as the Secretary of State for the Colonies has pointed out in a letter to the High Commissioner for Malaya, to ensure an adequate number of consumers' voted for the agreement in the crucial few days preceding June 30. The referendum is to be completed by August 12. Voters will clearly have a serious responsibility. If, as this letter seems to imply, United Kingdom support for this proposal was the price of the French signature, and if other vital signatures are dependent on the French, then the vote will not in effect be on a ceiling price but on the existence of the agreement in its present form. For the inference from the situation is that if the price is not lowered the French Government will not proceed to ratify the agreement. Meanwhile, Belgian Congo producers have let it be known that they do not like the proposal—they had argued for a ceiling price of £960 at Geneva—but it is believed that both the Belgian and Dutch Governments are prepared to support the proposal. However strongly the producers may dislike the cut it would be a hard decision to reject it now that the draft agreement is in sight of ratification and implementation.

The inquiry into the U.S. Tin Corporation's Lost River mine in Alaska continues to produce stories reminiscent of the East African groundnuts scheme and has brought from Mr. Mansure of G.S.A. the statement that "men successful in other lines of business entered the mining field, particularly in exploratory work on critical minerals, and all too often failed because of their lack of know-how." Mr. Mansure also gave the names of four other government-aided mining ventures which were to be investigated.

The International Tin Study Group has reported world mine production tin in concentrates in May as 14,800 l.tons compared with 13,500 l.tons in April. The increase was mainly due to the sharp rise in Bolivian exports from 1,497 l.tons in April to 3,128 in May; Indonesian output was also heavier at 2,874 l.tons. Tin metal figures available for June are, Malaya 5,135 l.tons, U.K. 2,403, U.S. 1,205 and Belgium 657. World tin stocks at the end of April were 88,700 l.tons compared with 94,400 l.tons at the end of March.

We give below the latest available output figures of tin concentrates for the chief producing countries for the current year compared with the corresponding period of a year ago. These point to a continuing lower trend in mine output, although curiously enough smelter output is running at a substantially higher rate. Latest international study tin figures show that exclusive of the U.S.S.R., world mine production for the first five months of the year totalled 66,225 tons, equivalent to an annual rate of 157,700 tons compared with a total in 1953 of 175,000 tons. On the other hand the five months smelter output totalled 79,025 tons, equivalent to an annual rate of 188,500 tons compared with 180,500 in 1953.

Country	*Period*	*1954*	*1953*
Belgian Congo	Jan-June	4,894	6,617
Bolivia*	Jan-May	10,126	14,879
Indonesia	Jan-June	15,962	15,633
Malaya	Jan-June	29,535	27,532
Nigeria	Jan-June	3,781	4,129
Thailand	Jan-May	3,991	4,277

* Exports

ZINC.—The American market has continued quiet. With stockpile purchases holding the price at 11 c. East St. Louis Prime Western, producers have been able to watch the fall on the London market with some equanimity; the fall has not threatened the New York price but, to some, it has strengthened the case for higher import duties. Furthermore, producers have taken courage from the President's decision to raise the tariff on Swiss watches, and they are also convinced that the figures for the month of July will show a gratifying fall in their stocks. Perhaps it should be said that the most important arguments advanced by the President in support of the higher watch tariff

are not strictly applicable to lead and zinc mining; while the latest reports suggest that the effect of the higher tariff on Swiss sales is likely to be negligible and the decision is not perhaps so comforting as some have thought. The G.S.A. has asked producers to offer newly mined domestic zinc for delivery before October 15.

Iron and Steel

With growing impatience, the makers of iron and steel are awaiting the end of the holiday period and the return to full production. Usually this is a slack time in the steel trade, but recent events have confounded all past experience. Buyers are already seeking cover for their autumn requirements; order books are rapidly filling up, and in some branches of the industry outputs to the end of the year are already bespoken.

The firing of a new blast furnace at Scunthorpe with an estimated capacity of nearly 1,000 tons a day will not completely restore equilibruim between the supply and demand for basic pig iron, and the completion of further blast furnace capacity is eagerly awaited. Meanwhile the engineering foundries are receiving only minimum tonnages of low phosphorous and haematite irons whilst the iron foundries are showing more interest in covering their forward requirements.

Improvement in the home and overseas trade in re-rolled bars and sections promises an increased consumption of some finished steel. This, however, can be readily provided by British steel makers without recourse to bigger imports from Continental ports. Supplies of sheet, bars and slabs also are ample for the current and prospective requirements of the sheet trade which is still on the crest of a wave of prosperity. Export quotas for black and galvanized sheets for shipment up to the end of December have been fully taken up, and there are still so many overseas inquiries that applications are being put forward for further export licences.

No less impressive is the spate of orders for heavy sections and joists which stems, no doubt, from the huge constructional works now in hand. Many mills are already fully booked to the end of the year. Programmes of rolling stock replacements and track renewals for British railways are also very extensive, whilst the boom in the motor trade has raised this industry to top rank amongst steel consumers.

Under an Order which became operative on Sunday last, producers of all grades of pig iron except basic and of steel ingots are required to pay respective levies of 4d. and 4½d. per ton to provide an income for the Iron and Steel Board.

The London Metal Market

(From Our Metal Exchange Correspondent)

Markets generally have been rather quiet owing to the August Bank Holiday, and similar conditions can be expected over the next week or two as many consumers have closed their works for annual holidays.

Fluctuations in tin prices in London have not been spectacular and have more or less reflected movements in the Eastern market. It is reported from the Hague in connection with the International Tin Agreement that France has put forward a proposal to reduce the ceiling price from £880 to £840 per ton, and that the Belgian and Netherlands governments are likely to accord their support. It is understood that the Belgian Congo producers strongly criticize the suggested alteration which is said to be backed by Britain. It is claimed that the production costs for Belgian Congo tin are much higher than those for tin produced in the Far East. On Thursday morning the Eastern price was equivalent to £753⅜ per ton c.i.f. Europe.

Copper prices have shown a sagging tendency, although Continental demand is still quite good, and the U.S.A. report that the rate of sales has been satisfactory if somewhat lighter owing to some of the large consuming plants closing for the August holidays.

Lead quotations have eased back, owing to some falling off in demand for seasonal reasons and the uncertainty as to what action will be taken in the United States on the tariff question for lead and zinc now that increased import duties have been sanctioned for Swiss watches. In America demand is reported to be fairly satisfactory.

Zinc is also under the influence of annual holidays, and, with no scarcity of sellers of nearby metal, prices have given way almost daily although some recovery took place on Wednesday. On the Continent demand is fairly good, and producers there are now asking a slight premium over the London price whereas a short time ago they were offering material at a slight discount.

Closing prices and turnovers are given in the following table which covers four days instead of the usual five owing to the August Bank holiday.

	July 29		August 5	
	Buyers	*Sellers*	*Buyers*	*Sellers*
Tin				
Cash	£748	£749	£746	£747
Three months	£745	£745½	£743	£744
Settlement	£749		£747	
Week's turnover	695 tons		425 tons	
Lead				
Current month	£92¾	£93¼	£94¼	£94½
Three months	£91½	£91¾	£92¼	£92¾
Week's turnover	3,575 tons		1,200 tons	
Zinc				
Current month	£74⅞	£75	£74⅛	£74¼
Three months	£75⅜	£75½	£74⅜	£74½
Week's turnover	4,400 tons		3,300 tons	
Copper				
Cash	£234¾	£235	£234¾	£235
Three months	£234¼	£234½	£233¾	£233½
Settlement	£235		£235	
Week's turnover	5,350 tons		3,650 tons	

OTHER LONDON PRICES — AUGUST 5

ANTIMONY

English (99%) delivered, 10 cwt. and over .. .. £210 per ton
Crude (70%) .. .. .. £200 per ton
Ore (60% basis) .. .. .. 22s./24s. nom. per unit, c.i.f

NICKEL

99.5% (home trade) .. .. £483 per ton

OTHER METALS

Aluminium, 99.5%, £156 per ton
Bismuth (min. 2 cwt. lots) 16s. lb.
Cadmium (Empire), 12s. lb.
Chromium, 6s. 5d./7s. 6d. lb.
Cobalt, 20s. lb.
Gold, 248s. 11½d. f.oz.
Iridium, £45 oz. nom.
Magnesium, 2s. 6d. lb.
Manganese Metal (96%-98%) £225/£262
Osmiridium, £40 oz. nom.
Osmium, £50 oz. nom.
Palladium, £7 10s. oz.
Platinum, £30/£31
Rhodium, £42 oz.
Ruthenium, £22 10s. oz.
Quicksilver, £100 ex-warehouse
Selenium, 35s. 9d. nom. per lb.
Silver 72⅛d. f.oz. spot and 72d. f'd.
Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth .. .. 50% 7s. 3d. lb. c.i.f.
40% 6s. 3d. lb. c.i.f.
Chrome Ore—
Rhodesian Metallurgical (lumpy) £13 12s. per ton c.i.f.
" Refractory £13 4s. per ton c.i.f.
Magnesite, ground calcined .. £26-£27 d/d
Magnesite, Raw .. .. .. £10 - £11 d/d
Molybdenite (85% basis) .. 102s. 4d.-103s. per unit c.i.f.
Wolfram (65%) .. .. .. World buying 185s./190s.nom.
" " .. .. .. U.K. Selling 190s. + 10s. charges
Scheelite (65%) .. .. .. World buying price nom.
" " .. .. .. U.K. Selling 190s. + 10s. charges
Tungsten Metal Powder .. .. 15s. 3d. nom. per lb. (home)
(98% Min. W.)
Ferro-tungsten .. .. .. 12s. 3d. nom. per lb. (home)
Carbide, 4-cwt. lots .. .. £37 6s. 3d. d/d per ton
Ferro-manganese, home .. .. £54 15s. 0d. per ton
Manganese Ore Indian c.i.f. Europe (46%-48%) .. .. .. 70d./75d. per unit nom.
Brass Wire .. .. 2s. 6½d. per lb. basis
Brass Tubes, solid drawn .. 1s. 10½d. per lb. basis

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

Recently there has been much more interest in Kaffirs. This has been partly due to rumours of a fresh devaluation of the French franc and some buying from Paris. Finance houses were a steady market after a check encountered by some issues on Tuesday. Gains on Wednesday offset most losses. The Strathmore, General Mining and Anglo American link-up still caused interest and companies concerned in uranium production, like Johnnies, and those fostering new properties, such as West Rand Investment Trust and West Witwatersrand gained ground.

Individual mines were mostly affected by the July figures. Blyvooruitzicht and Brakpan recorded small gains due to the improved results. Luipaards Vlei, recently neglected, advanced on hopes that uranium will soon change the company's fortunes. Vogelstruisbult rose sharply due to favourable press mention concerning the company's uranium outlook and interest also revived for the same reason in Western Reefs. The Randfontein figures caused a slight disappointment.

As has been customary during the past year, the main activity was concentrated on the Orange Free State field. This movement was strongly supported from Johannesburg. The market has been chronically short of stocks which appears to mean that finance houses are unwilling to release shares at current prices. Apart from Freddies Consolidated, where continued losses discouraged buyers, good gains were recorded by market favourites in active trading conditions. Excellent July returns from President Steyn, Western Holdings and St. Helena helped these shares. Harmony and President Brand were to the fore and the strong investment demand for Ofsits continued. An optimistic view is being taken in the market concerning the future underground developments for nearly all properties on this field.

Some interest returned to West African and West Australian markets. In the former, Ashanti gained, as well as Bibiani due to the slightly better figures. On the former mine, developments at depths are still good. In the Australian section, Sons of Gwalia and Western Mining were features.

Diamond shares held recent gains well and there was little sign of profit-taking. Some renewed interest was also apparent in platinum issues.

Coppers were a very strong market. Rhodesia shares were all good and the Nchanga statement was well received. The longer life for the mine and the financing of developments from capital sources caused a sharp rise in value. This was reflected by all companies in this group. Bancroft were the star turn with a big jump to 24s. 6d. later some profit-taking set in. While the long term outlook for this property appears excellent, the present market price must now discount the immediate future to a very considerable extent. Chartered went ahead fast, the company holds some 3,000,000 Bancroft shares. Rio Tinto were also up due to capital possibilities.

Eastern tin shares turned slightly easier due to the probability of a lower ceiling price for the metal. This appears necessary in order to obtain French agreement to the international scheme. Nigerians were less affected and, where changed, were slightly harder owing to the columbite factor in most of the companies' earnings.

Barriers were unsettled due to the boom and slump in the Australian oil market. On the whole, they held up well but Mount Isa turned easier because of limestone supply difficulties.

Among miscellaneous base metal shares, Amalgamated Collieries and Associated Manganese went ahead. Murchison again jumped on Cape buying. Wankie Colliery gained the turn owing to the better output figures.

Canadian shares hardened following the improvement in American markets. Hollinger jumped on news of the first shipment of Ungava iron ore from Seven Islands. International Nickels were well up due to the company's production programme getting into full swing and the sound outlook for the mineral.

	Price Aug. 4	+ or — on week
FINANCE		
African & European	2 3/16	.....
Anglo American Corpn.	7 1/2	—1/2
Anglo-French	21/3	—7 1/2d
Anglo Transvaal Consol.	23/9	.....
Central Mining (£1 shrs.)	34/6	—6d
Consolidated Goldfields	50/-	.....
Consol. Mines Selection	37/6	+7 1/2d
East Rand Consols	3/-	+1 1/2d
General Mining	4 1/2	.....
H.E. Prop. 5/- Shares	9/6	—1 1/2d
Henderson's Transvaal	6/9	—3d
Johnnies	48/1 1/2	+7 1/2d
Rand Mines	3 1/2	.....
Rand Selection	42/6	+7 1/2d
Strathmore Consol.	38/9	—1/3
Union Corp. (2/6 units)	30/9	.....
Vereeniging Estates	4 1/16	+1/16
Writs	36/6	+10 1/2d
West Wits	40/-	+3d
RAND GOLD		
Blyvoors	33/6	+6d
Brakpan	7/4 1/2	+4 1/2d
City Deep	14/9	.....
Consol. Main Reef	18/9	.....
Crown	41/3	—7 1/2d
Daggas	71/3	+7 1/2d
Doornfontein	24/3	+3d
Durban Deep	30/-	.....
E. Daggas	10/3	—3d
E. Geduld (4/- units)	26/9	.....
E. Rand Props	2 1/16	+1/16
Geduld	3 1/8	+1/16
Govt. Areas	10/9	.....
Grootvlei	17/9	.....
Libanon	10/3	+1 1/2d
Luipaards Vlei	20/3	+6d
Marievale	17/6	.....
Modderfontein East	14/4 1/2	.....
New Kleinfontein	12/-	.....
New Pioneer	13/3	+6d
Randfontein	62/3	—1/6
Robinson Deep	17/6	+1/3
Rose Deep	12/6	.....
Simmer & Jack	3/6	.....
S.A. Lands	21/-	+1/7 1/2
Springs	3/3	—1 1/2d
Stilfontein	28/6	+3d
Sub Nigel	38/9	.....
Van Dyk	3/9	—1 1/2d
Venterspost	11/9	+3d
Vlakfontein	14/-	+6d
Vogelstruisbult	35/9	+1/9
West Driefontein	5 1/2	—1/2
W. Rand Consolidated	50/-	+3d
Western Reefs	47/9	+1/3
O.F.S.		
Freddies	5/9	.....
Freddies Consolidated	20/-	+3d
F. S. Geduld	4 15/16	+1/16
Geoffries	13/3	+1/-
Harmony	36/-	+2/6
Loraine	11/6	+1/3
Lydenburg Estates	16/9	+9d
Merriespruit	11/1 1/2	+7 1/2d
Middle Wits	14/6	+1/1 1/2
Ofsits	63/-	+2/6
President Brand	65/-	+3/-
President Steyn	34/6	+2/6
St. Helena	25/7 1/2	+1/-
Virginia Ord.	14/1 1/2	+10 1/2d
Welkom	20/10 1/2	+9d
Western Holdings	4 3/16	+1/16
WEST AFRICAN GOLD		
Amalgamated Banket	1/3	.....
Ariston	6/3	+3d
Ashanti	19/-	+6d
Bibiani	4/4 1/2	+3d
Bremang	1/4 1/2	—1 1/2d
G.C. Main Reef	3/11 1/2 XD	.....
Konongo	2/4 1/2	+1 1/2d
Lyndhurst Deep	10 1/2d	.....
Marlu	1/-	.....
Taquah & Abosso	1/9	—1 1/2d
W. Selection & Dev.	6/-	.....
AUSTRALIAN GOLD		
Boulder Perseverance	7/3	+3d
Gold Mines of Kalgoorlie	14/9	.....
Great Boulder Prop.	9/3	.....
Lake View and Star	15/7 1/2	+1 1/2d
Mount Morgan	18/3	.....
North Kalgurli	8/6	.....
Sons of Gwalia	6/9	+1/3
South Kalgurli	14/-	+3d
Western Mining	14/6 XD	+6d
MISCELLANEOUS GOLD		
Cam and Motor	8/7 1/2	.....
Champion Reef	5/-	.....
Falcon Mines	7/9	.....
Globe & Phoenix	24/-	—1/9
G.F. Rhodesian	5/4 1/2	—1 1/2d
London & Rhodesian	4/4 1/2	.....
Motapa	1/4 1/2	+1 1/2d
Mysore	5/6	.....
Nundydroog	6/9	+3d
Ooregum	4/1 1/2	—1 1/2d
MISCELLANEOUS GOLD (contd.)		
St. John d'el Rey	16/9	—3d
Zams	38/-	.....
DIAMONDS & PLATINUM		
Anglo American Inv.	6 15/16	+1/16
Casts	26/3	.....
Cons. Diam. of S.W.A.	6 1/16	+1/16
De Beers Defd. Bearer	5 15/16	.....
De Beers Pfd. Bearer	17 1/2	—1/2
Pots Platinum	10/-	+7 1/2d
Watervaal	15/9	+4 1/2d
COPPER		
Chartered	82/3	+4/3
Esperanza	5/9	—4 1/2d
Indian Copper	4/6 XD	+3d
Messina	4 3/16	+1/16
Nchanga	9 1/16	+1/16
Rhod. Anglo-American	73/9	+3/3
Rhod. Katanga	12/9	+6d
Rhodesian Selection	20/3	+1/-
Rhokana	26	+1/-
Rio Tinto	34 1/2	+1 1/4
Roan Antelope	19/3	+10 1/2d
Selection Trust	43/1 1/2	.....
Tanks	5 1/16	.....
Tharsis Sulphur Br.	3 1/8	—1/8
TIN (Eastern)		
Ayer Hitam	26/3	—3d
Gopeng	8/-	—1 1/2d
Hongkong	7/10 1/2	—1 1/2d
Ipoh	16/6	+3d
Kamunting	8/1 1/2	—1 1/2d
Kepong Dredging	3/9	—1 1/2d
Kinta Tin Mines	10/3	—1 1/2d
Malayan Dredging	27/3	—3d
Pahang	11/9	.....
Pengkalen	9/-	—1 1/2d
Petaling	7/9	+1 1/2d
Rambutan	17/9	+3d
Siamese Tin	6/10 1/2	—1 1/2d
Southern Kinta	17/4 1/2	—6d
S. Malayan	25/-	.....
S. Tronoh	9/9	.....
Sungei Kinta	10/9	.....
Tekka Taiping	5/9	.....
Tronoh	24/9	+3d
TIN (Nigerian and Miscellaneous)		
Amalgamated Tin	14/7 1/2	+1 1/2d
Beralt Tin	25/9	—3d
Bisichi	6/1 1/2	.....
British Tin Inv.	15/4 1/2 XD	—4 1/2d
Ex-Lands Nigeria	3/- XD	.....
TIN (Nigerian and Miscellaneous) contd.		
Geevor Tin	11/9	.....
Gold & Base Metal	3/-	+1 1/2d
Jantar Nigeria	9/1 1/2	.....
Jos Tin Area	13/3	+3d
Kaduna Prospectors	2/3	.....
Kaduna Syndicate	2/6	+3d
London Tin	6/1 1/2	.....
United Tin	3/3	+1 1/2d
SILVER, LEAD, ZINC		
Broken Hill South	50/9	.....
Burma Mines	2/3	—1 1/2d
Consol. Zinc	34/3	+3d
Lake George	6/9	+3d
Mount Isa	45/- XD	—6d
New Broken Hill	27/6	+3d
North Broken Hill	68/3	+9d
Rhodesian Broken Hill	10/3	—1 1/4d
San Francisco Mines	17/3	—3d
Uruwira	4/-	+1 1/2d
MISCELLANEOUS BASE METALS & COAL		
Amal. Collieries of S.A.	46/3	+2/3
Associated Manganese	46/9	+9d
Cape Asbestos	24/9	—3d
C.P. Manganese	40/9	.....
Consol. Murchison	52/6	+5/-
Mashaba	1 1/2d	.....
Natal Navigation	3 1/16	.....
Rhod. Monteleo	1/3	.....
Turner & Newall	85/3	+3d
Wankie	15/1 1/2	+3d
Witbank Colliery	4 1/16	.....
CANADIAN MINES		
Dome	$30 1/2	+2
Hollinger	$34	+4 1/2
Hudson Bay Mining	$85	.....
International Nickel	$81	+3 1/2
Mining Corpn. of Canada	£5 1/2	.....
Noranda	$135	—1
Quemont	£6 1/4	—1/2
Yukon	3/9	+1 1/2d
OIL		
Anglo-Iranian	30 1/16	+1/16
Apex	53/3	+1 1/2d
Attock	48/6	+2/10 1/2
Burmah	80/6	+6d
Canadian Eagle	32/6	+1/-
Mexican Eagle	17/9	.....
Shell (bearer)	5	+1/32
Trinidad Leasehold	23/6	.....
T.P.D.	22/6	—6d
Ultramar	28/-	—3d

ANALYSIS OF RAND AND O.F.S. QUARTERLIES

JUNE QUARTERLIES SHOW SOLID PROGRESS IN O.F.S.

Sufficient time has now elapsed since the publication of the June quarterly results in respect of Rand and O.F.S. producing and developing mines for a balanced view to be taken of future prospects. And now that the customary flurry is over it is quite apparent that apart from one or two encouraging announcements the reaction to the information published has been one of disappointment. Whether this was justified or not is, of course, another question but, undoubtedly, much of the optimism centred around the hope that bigger and better development values would be disclosed on the Orange Free State mines. It is, however, unwise to expect that the type of sensational result achieved in the March quarter can become a general feature quarter by quarter and, indeed, there are indications that some mines in this area may now be entering their first period of consolidation.

DEVELOPMENT LINKED WITH GEOLOGICAL INVESTIGATION

It is well known that there is much about the new field as yet unknown to geologists. But since initial development operations carried out in the area it became evident that the ground formations encountered were very different from those on the Rand. As it is of the utmost importance that as much as possible must be found out about the area, few would contradict the reasoning that the only way to do this conclusively is by underground development. An interesting question thus arises in that a goodly number of Orange Free State mines have now reached the stage at which for the first time since development began there is a chance to think in terms other than the immediate future. That being so, what better opportunity could there be, therefore, for exploration of the ground underlying their properties. Indeed, there would be no reluctance shown by the mining companies or "houses" towards fostering such an exploration programme for they are vitally interested in this question. This could well be the explanation for the development work now progressing in the form of large scale driving towards the boundaries of several of the properties—particularly Free State Geduld, Western Holdings, Welkom, St. Helena and Presidents Brand and Steyn—in which areas are the majority of the young O.F.S. producing mines. Further, this will account for the apparent lack of exceptionally good results last quarter as driving main haulageways to open up the properties has a different objective in view than proving additional high-grade ore.

AN IMPROVING LABOUR CLIMATE

Little could be achieved by the South African Gold Mining industry if the labour supplies were inadequate. It is therefore most encouraging to see the increases which have been made in the numbers employed since the end of last year. Moreover, this trend has established itself despite the traditional seasonal retreat of Africans from the goldfields and thus poses the question of the reason for this encouraging change. One of the most likely motives underlying this trend is connected with the unprecedented attractions which the new gold mining towns of the Orange Free State have to offer. In these centres, which are now coming into their own due to the increasing prosperity of the field, amenities of life are offered which rival those of any other South African industry, and carry thereby a strong inducement towards the permanent employment so much desired by, but hitherto unknown to, the industry. In addition, events have already shown that labour which had been previously attracted away from the mines either to other industries, or back to the land, is being enticed back to the mines of the Orange Free State in larger numbers than to the Rand mines, which need it so badly.

QUARTERLIES ON THE WHOLE SATISFACTORY

The outstanding June quarterly reports were received from the Orange Free State mines. In the forefront of these, Welkom reported development values which marked the most notable advance by this mine since development was started. Values rose considerably above those obtained for many months, added to which payability reached the high level of 77 per cent. F. S. Geduld, however, reported a sharp decrease in value, although there was an equally sharp rise in the amount of footage sampled—payability at this mine, although down from the previous 100 per cent level still remains uncommonly high. But much development work still remains to be completed before sampling reaches a level at which sufficient payable footage can be established to enable a factual view to be taken of future prospects.

That the sharp improvement at St. Helena during the March quarter has not been maintained is not a very serious matter in view of previous values and payability which are above those now reported. There has been, therefore, no departure from the record of steady progress characteristic of this mine, which was the first O.F.S. mine to come into production.

On the other hand, the reports received from Ellaton and Stilfontein on the Far West Rand must be regarded as disappointing. At both these mines there was a fall in both values obtained and footage sampled—at Stilfontein the values obtained fell to a level lower than those reported for more than a year. It would, however, be unwise to set too much store on what must be considered as only a temporary set-back, as the results for the month of July, just published, show earnings of £192,156 which compare very favourably with the best in South Africa. The publication of Ellaton's most satisfactory ore reserves, will, perhaps, be regarded as offsetting to some extent this lapse on the Far West Rand.

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Ellaton, however, was not the only Far West Rand mine to publish details of its first estimate of ore reserves for these have also been given by West Driefontein and Doornfontein. At the former, while a total of 730,000 tons might not look very impressive against West Drie's envisaged expansion programme, it does not, of course, provide anything more than a preliminary picture. At a mine of this calibre where payability runs constantly at 100 per cent there must be many thousands of feet which although not qualifying for the category of blocked out ore reserves, need only a small amount of development to qualify as such. In any event, at the present rate of milling no difficulty should arise in the near future, while in the longer run, the ore reserve position will strengthen as the crushing capacity warrants. Nevertheless, contrasted with this result it is creditable that Doornfontein, which started production only at the end of last year, should already have established

FINANCIAL RESULTS

(Cumulative and Comparative "this" financial year to June 30, 1954 with "last.")

GROUP	COMPANY	ORDINARY SHARES IN ISSUE	Months since year end	PROFIT AND LOSS RESULTS £(000)										Current Financial Year's Capital Expenditure (Gold)	EARNINGS, DIVIDENDS AND YIELD PER SHARE						
				Working Profit		Premium Revenue		Uranium Profit		Taxation and/or Mining Lease		Net Profit After Tax**			Earned in current year to date‡‡	Paid 1953-54		Paid 1952-53		Yield on Price 3/8/54
				This	Last	This	Last	This	Last	This	Last	This	Last			June	Dec.	June	Dec.	
																s. d.	s. d.	s. d.	s. d.	
Gold Fields	*D'nfontein*	9,828,000 (10/-)x	12	449·7	—	·7	—	—	—	—	—	450·4	—	375·2	11d.	—	—	—	—	—
	Libanon	7,937,300 (10/-)	12	573·6	500·7	9·8	50·0	—	—	—	—	579·1	547·4	480·2	1/5½	3	3	3	3	4·7
	Luipaards Vlei .	4,969,105 (2/-)	12	508·3	568·1	9·7	57·3	—	—	8·5	—	503·7	630·9	96·2	2/0½	7½	7½	7½	7½	6·1
	Rietfontein C. .	1,122,252 (5/-)	6	144·1	152·3	—	9·0	—	—	72·4	83·5	71·7	77·8	4·5	1/3½	1 3	1 4½	1 3	1 4½	14·9
	Robinson Dp. .	2,000,000'B'(7/6)	6	140·7	77·6	·1	26·7	—	—	50·1	1·3	90·7	103·0	15·9	11d.	1 3	9	9	9	11·2
	Simmer	6,750,000 (2/6)	6	64·5	76·6	·1	28·1	—	—	1·9	5·5	62·7	99·2	12·7	2d.	3	4	4	4	16·1
	Sub Nigel	1,771,875 (10/-)	12	1193·8	1352·2	12·0	69·7	—	—	544·2	708·5	661·4	718·2	10·9	7/5½	3 9	3 9	4 0	4 0	18·7
	Venterspost ...	4,900,000 (10/-)	12	699·5	726·0	13·5	72·8	—	—	98·5	218·2	606·7	579·0	436·4	2/6	5	5	5	5	6·9
	Vlakfontein ...	6,000,000 (10/-)	6	425·9	421·0	·1	19·7	—	—	150·1	173·1	275·9	267·6	120·8	11d.	6½	6½	6½	8	7·7
	Vogels	5,028,571 (10/-)	6	648·7	574·4	·1	37·7	—	—	103·8	228·0	545·0	384·1	13·7	2/2	1 6	1 1½	1 1½	1 0	7·5
	W. Drie	7,041,080 (10/-)	12	3286·6	2032·8	16·9	58·8	—	—	934·2	158·5	1871·1	1753·1	1503·5	5/4	1 3	9	6	—	1·7
Anglo American	Brakpan	4,600,000 (5/-)	6	84·3	124·6	·2	35·5	—	—	6·6	28·3	73·5	131·8	3·1	3½d.	4½	6	6	9	12·0
	Daggas	7,000,000 (5/-)	6	1874·2	2010·9	·5	77·2	378·4	120·0	1222·6	952·0	1030·5	1256·1	12·3	2/11½	3 0	3 0	3 0	3 0	8·5
	East Daggas...	3,730,000 (10/-)	6	276·7	289·9	·1	25·6	—	—	120·0	145·6	156·8	169·9	2·3	10d.	9	10½	9	1 0	15·4
	S.A. Lands	2,475,000 (3/6)	6	322·1	304·2	·2	28·9	—	—	137·5	136·0	184·8	197·1	4·0	1/6	1 3	1 6	1 3	1 9	13·7
	Springs	10,110,000 (5/-)	6	46·2	65·2	·2	31·9	—	—	1·7	5·8	44·7	91·3	3·1	1d.	—	1½	1½	3	3·7
	Welkom	10,000,000 (5/-)x	6	12·0	97·6	·1	16·9	—	—	—	—	12·1	114·5	253·0	—	—	—	—	—	—
	W. Holdings...	7,496,376 (5/-)x	6	288·6	—	·1	—	—	—	—	—	288·7	—	367·7	9d.	—	—	—	—	—
	W. Reefs.....	7,000,000 (5/-)x	6	389·5	487·2	·2	35·4	271·6	—	—	—	661·3	522·6	311·0†	1/10½	1 3	1 3	1 3	1 3	5·2
Central Mining	*Blyvoor*	24,000,000 (2/6)	12	5596·2	6172·4	31·9	189·9	532·0	21·7	2946·9	2921·4	3238·3	3504·8	497·7	2/8	1 2	1 4	1 4	1 6	7·4
	City Deep.....	2,026,832 (£1)	6	102·4	139·7	·3	46·3	—	—	3·7	5·2	110·1	198·5	40·6	1/1	6	6	6	1 0	6·6
	Consol M.R. ..	1,247,602 (£1)	12	271·1	269·8	13·2	75·0	—	—	30·5	84·2	300·3	314·0	16·7	4/10	1 9	1 9	1 9	2 3	18·6
	Crown Mines..	1,886,125 (10/-)	6	288·9	227·4	·4	62·5	—	—	5·9	8·8	320·0	302·3	5·9	3/5	3 0	3 0	2 6	2 6	14·3
	Durban Deep..	2,325,000 (10/-)	6	258·9	431·0	·3	46·6	—	—	5·3	123·9	262·2	368·3	65·6	2/3	1 6	1 9	1 9	2 0	10·8
	E. Rand Prp...	3,960,000 (10/-)	6	703·5	609·1	·4	61·9	—	—	151·3	132·7	561·3	602·2	175·2	2/11	1 9	1 9	1 9	2 6	7·4
	Modder B.	2,800,000 (2/-)	6	15·4	10·3	—	9·1	—	—	2·4	2·4	20·3	25·6	—	2d.	—	—	—	—	—
	Modder East ..	930,805 (£1)	12	156·4	238·5	7·2	41·1	—	—	32·6	114·6	150·0	187·5	—	3/3	1 6	1 6	1 6	1 6	19·2
	New Modder ..	2,800,000 (3/6)	12	11·0	12·2	·8	4·5	—	—	2·0	23·5	14·8	41·5	CR 2·9	1d.	—	—	—	—	—
	Rose Deep	700,000 (17/-)	6	73·1	43·8	·1	17·7	—	—	13·3	3·8	62·4	62·1	6·1	1/9	—	—	—	—	—
	T'vaal G.M.E.‡	852,500 (£1)	6	4·7	12·5	—	8·1	—	—	1·8	2·0	17·3	28·6	18·0	5d.	6	9	6	9	4·8
	Welgedacht ...	1,358,030 (10/-)x	12	29·1	51·7	2·5	12·7	—	—	—	—	24·1	54·8	—	4d.	—	—	—	—	—
J.C.I.	*E. Champ d'Or.*	2,079,000 (2/6)	6	L112·2	9·8	—	5·9	69·0	—	—	L 3·0	L 42·6	14·6	—	—	—	—	2	3½	—
	Govt. G.M.A..	5,600,000 (5/-)	6	163·3	303·8	·3	50·1	—	—	19·6	76·9	161·0	323·0	239·1	7d.	7½	9	1 0	1 0	12·2
	Randfontein ...	4,063,553 (£1)	6	L234·6	137·4	·3	57·4	316·0	—	—	—	102·7	228·1	·3	6d.	1 0	1 0	1 0	1 0	3·1
Union Corporation	East Geduld...	9,000,000 (4/-)	6	1782·2	1794·6	·5	60·9	—	—	972·3	1004·7	849·0	888·9	11·1	1/10½	1 9	1 9	1 9	2 1	12·9
	Geduld Prop...	1,460,857 (£1)	6	151·4	195·2	·2	24·1	—	—	46·3	57·9	412·7	459·2	—	5/8	5 6	5 9	5 9	6 3	16·4
	Grootvlei	11,438,816 (5/-)	6	1269·1	1380·3	·5	61·9	—	—	660·8	753·6	618·9	696·6	16·8	1/1	1 0	1 1	1 2	1 3	11·2
	Marievale	4,500,000 (10/-)	6	422·0	397·4	·2	23·2	—	—	198·5	194·1	222·1	227·0	7·5	1/-	11	11	10	10	10·2
	St. Helena	9,625,000 (10/-)	6	296·8	113·3	·2	19·0	—	—	—	—	262·9	118·6	174·4	6½d.	—	—	—	—	—
	Van Dyk.....	5,532,000 (10/-)	6	11·6	31·5	·2	21·7	—	—	—	—	10·6	62·2	10·8	½d.	—	—	—	—	—
Gen. Mng.	S. Roodepoort.	1,420,662 (10/-)	12	231·4	270·6	2·3	15·6	—	—	111·0	142·5	133·9	152·9	15·4	1/10½	9	9	9	9	11·5
	W. Rand††	4,250,000 (10/-)a	6	9·4	—	·3	—	903·1	—	356·0	—	617·6	—	119·4	2/2§§	1 9	2 0	1 9	1 6	7·4
Anglo T'vaal	*Klerksdorp*	600,000 (5/-)	6	L 8·6	4·1	—	1·8	—	—	—	—	L 10·6	4·1	34·3	—	—	—	—	—	—
	Rand Leases ..	3,600,000 (10/-)	12	232·4	429·2	14·4	88·4	—	—	17·0	110·6	257·6	469·0	119·2	1/6	4½	3	—	—	—
	Village M.R. ..	6,068,457 (1/3)	12	141·7	166·4	3·1	15·9	—	—	50·5	68·0	20·3	106·0	4·3	1d.	1·5	1·5	1·8	1·8	12·5
Str.-more	*Ellaton*	787,500 (5/-)x	12	176·5	—	—	—	—	—	—	—	204·7	—	209·1	5/-	—	—	—	—	—
	Stilfontein.....	13,062,920 (5/-)x	6	892·1	494·5	·2	27·4	143·6	—	—	—	1035·9	521·9	753·3	1/4	—	—	—	—	—
Others	N. Kleinfontein	1,735,000 (£1)	6	92·6	160·3	·2	20·0	—	—	·1	42·0	91·2	138·3	15·8	1/0½	9	1 1½	1 4½	1 6	15·0
	Spaarwater....	7,974,968 (5/-)	6	L 1·6	L 20·2	—	3·5	—	—	—	—	L 1·6	L 16·7	3·1	—	—	—	—	—	—
	Nigel Gold	1,439,269 (10/-)	6	L 6·4	L 3·2	—	3·8	—	—	—	—	L 6·4	L ·5	—	—	—	—	—	—	—
	W. Nigel.....	7,974,720 (2/6)	12	96·9	85·3	2·2	11·4	—	—	—	—	104·6	101·1	37·7	3d.	—	1½	—	—	5·5

** Includes sundry revenue less sundry expenses ‡‡ Calculated on net profit after tax † Including uranium cap. exp. * Calculated on stoping width
§§ After Defd. shares' participation x Also Loan Capital and/or loans other than uranium *Italics:* Scheduled uranium producers L indicates loss
‡ Profit figures take into account £15,469 from sale of Copper/Gold concentrate †† 1953 figures not comparable a Also 25,000 Defd. shares (£1) which take first 25 per cent of distributable profits

the greater figure of 807,000 tons—but the grades of the two mines are, of course, very different; Doornfontein's 7 dwt. being less than half West Driefontein's 16.4 dwt.

DEVELOPERS MAKE GOOD PROGRESS

Amongst the developers, a very good showing was made by Harmony during the quarter and although only 795 ft. were sampled all of it was payable and additionally the average values obtained of 901 in.-dwt. over an unusually wide channel width of 68 in. goes a long way towards justifying the earlier promise of this mine which was largely based upon good borehole results. From Virginia also came the good news that the highest values since development began had been obtained, unfortunately, however, payability fell away. At Merriespruit, its neighbour, much headway was made in development but both values and payability were lower than in the previous quarter. Although this comparison is not entirely representative for the March quarter results were unusually high.

DEVELOPMENT AND MILLING RESULTS

(Cumulative and Comparative "this" financial year to June 30, 1954 with "last.")

GROUP	COMPANY	Months since year end	TOTAL ORE RESERVES			DEVELOPMENT RESULTS						MILL THROUGHPUT													
						Ft. Sampled (000)		Payability %		Av. Value (In. dwt.)		Tonnage Milled (000)		Tonnage Cost per Ton		Gold Recovered Ounces (000)		Gold Recovered Grade (dwt.per ton)		Gold Recovered Cost per ounce		Working Profit Per ton		Working Profit Per oz.	
			Tons (000)	Value (dwt.)	Inch dwt.	This	Last	This	Last	This	Last	This	Last	This	Last	This	Last	This	Last	This	Last	This	Last	This	Last
Gold Fields	*D'nfontein*	12	807	7·0	281	9·9	—	79	—	336*	—	379	—	50/11	—	113·9	—	6·0	—	169/4	—	23/9	—	78/11	—
	Libanon	12	1,993	4·5	237	26·1	25·9	66	65	303*	325*	1,081	985	40/4	39/8	221·4	197·5	4·1	4·0	196/8	197/11	10/7	10/2	51/10	50/8
	Luipaards Vl.	12	2,222	4·4	181	33·4	28·0	60	60	243*	251*	1,285	1,232	38/10	37/6	241·6	231·2	3·7	3·7	206/7	199/7	7/11	9/2	42/1	49/2
	Rietfontein C.	6	424	5·2	263	4·6	4·9	59	46	536*	381*	166	159	38/7	36/1	37·3	35·5	4·5	4·5	171/10	161/7	17/4	19/2	77/4	85/10
	Robinson Dp.	6	1,351	4·5	233	3·5	5·7	44	44	475*	340*	580	577	47/9	44/10	122·7	110·8	4·2	3·8	226/-	233/5	4/10	2/8	23/-	14/-
	Simmer	6	1,610	3·9	184	16·7	11·7	36	38	268*	318*	756	734	38/5	37/8	121·9	117·8	3·2	3·2	238/4	234/9	1/8	2/1	10/7	13/-
	Sub Nigel	12	1,464	8·1	301	35·0	35·5	26	32	342*	365*	795	792	52/3	50/11	263·3	270·9	6·6	6·8	157/10	148/11	30/-	34/1	90/8	99/10
	Venterspost	12	2,593	5·6	309	31·4	36·2	48	43	357*	381*	1,299	1,219	47/1	46/3	302·2	285·1	4·6	4·7	202/3	197/11	10/9	11/11	46/3	50/11
	Vlakfontein	6	1,358	8·4	346	15·3	13·5	35	34	368*	353*	229	218	51/10	50/11	82·0	78·9	7·2	7·2	144/8	140/9	37/2	38/7	103/10	106/8
	Vogels	6	3,189	5·5	233	15·1	17·5	36	48	288*	285*	613	570	41/11	42/6	155·0	144·1	5·0	5·0	165/9	168/3	21/2	20/2	83/8	79/9
	W. Drie	12	731	16·4	689	15·2	12·0	100	100	842*	832*	558	387	65/9	62/10	411·7	261·7	14·7	13·5	89/-	93/-	117/9	104/11	159/7	155/4
Anglo American	Brakpan	6	3,548	4·7	211	23·1	20·8	24	29	582	641	664	684	39/6	40/8	112·4	122·5	3·4	3·6	233/6	227/1	2/6	3/8	15/-	20/4
	Daggas	6	13,777	5·5	241	23·6	27·4	38	53	395	412	1,311	1,316	29/3	27/10	305·3	310·5	4·7	4·7	125/8	118/-	28/7	30/7	122/9	129/6
	East Daggas	6	4,332	4·3	159	15·9	20·4	18	23	251	250	558	536	32/4	32/5	94·8	93·6	3·4	3·5	190/1	185/7	9/10	10/10	58/4	61/11
	S.A. Lands	6	3,198	5·2	216	21·4	19·4	35	34	536	571	598	597	34/11	34/10	109·9	108·6	3·7	3·6	189/9	191/4	10/9	10/2	58/7	56/-
	Springs	6	2,764	4·6	200	11·0	12·1	39	34	670	587	776	889	33/8	32/8	108·8	122·6	2·8	2·8	239/10	236/9	1/2	1/6	8/6	10/7
	Welkom	6	1,305	5·0	246	12·0	7·3	74	63	418	363	413	362	48/10	43/9	82·2	71·8	4·0	4·0	245/7	220/5	7d.	5/4	2/11	27/2
	W. Holdings	6	787	10·1	485	6·1	—	86	—	773	—	272	—	62/4	—	91·5	—	6·7	—	185/4	—	21/3	—	63/1	—
	W. Reefs	6	4,763	4·9	233	21·8	20·4	45	47	467	405	686	647	37/10	35/10	135·7	133·0	3·9	4·1	191/3	174/5	11/4	15/1	57/5	73/3
Central Mining	*Blyvoor*	12	6,689	12·5	579	14·0	14·9	89	94	536	578	1,193	1,219	51/9	48/7	698·4	732·7	11·7	12·0	88/5	80/10	93/10	101/3	160/3	168/6
	City Deep	6	5,700	5·8	248	17·6	18·0	38	33	288	300	976	943	45/3	45/2	185·9	183·2	3·8	3·9	237/8	232/5	2/1	2/11	11/-	15/3
	Consol. M.R.	12	3,671	3·8	197	19·5	31·3	37	41	346	263	2,022	2,107	32/5	32/2	280·8	293·9	2·8	2·8	233/6	230/5	2/8	2/7	19/4	18/4
	Crown Mines	6	12,208	4·9	237	18·1	23·1	54	56	304	428	1,657	1,583	36/2	36/10	263·9	253·7	3·2	3·2	226/11	230/-	3/6	2/10	21/11	17/11
	Durban Deep	6	8,451	4·3	255	18·9	18·2	64	75	414	350	1,040	1,066	36/4	34/2	172·8	182·0	3·3	3·4	218/11	200/4	5/-	8/1	30/-	47/4
	E. Rand Prp.	6	7,987	5·3	257	10·9	6·7	56	62	543	314	1,172	1,113	44/9	43/3	267·2	243·4	4·6	4·4	196/1	197/9	12/-	10/11	52/7	50/-
	Modder B.	6	336	3·9	202	—	—	—	—	—	—	336	322	25/4	26/3	35·2	34·9	2·1	2·2	241/4	242/4	11d.	8d.	8/8	6/-
	Modder East	12	2,286	3·1	137	5·8	11·1	29	24	171	180	1,362	1,382	26/3	25/4	156·0	159·4	2·3	2·3	229/2	222/-	2/3	3/5	20/-	29/11
	New Modder	12	—	—	—	—	—	—	—	—	—	98	93	37/10	37/4	15·9	15·0	3·2	3·2	234/7	232/10	2/3	2/7	14/4	16/3
	Rose Deep	6	1,394	3·9	229	7·3	7·7	33	34	346	310	416	442	34/9	34/6	64·0	65·1	3·1	2·9	226/1	234/3	3/6	2/-	22/10	13/5
	T'v'l G.M.E.‡	6	225	7·9	—	1·7	4·5	35	46	302	251	146	161	56/7	49/9	31·6	32·1	4·3	4·0	261/6	249/8	8d.	1/7	3/-	7/9
	Welgedacht	12	419	2·8	108	4·4	3·9	29	29	131	133	396	403	29/3	28/4	48·8	49·8	2·5	2·5	237/7	229/8	1/5	2/7	11/11	20/9
J.C.I.	*E. Ch'p d'Or*	6	76	3·4	173	1·0	1·0	70	73	214	220	141	145	40/5	39/2	13·9	23·8	2·0	3·3	411/-	238/9	L15/11	1/5	L161/10	8/3
	Govt.G.M.A.	6	7,024	2·9	168	8·5	8·3	37	54	259	238	1,545	1,452	30/-	29/8	198·3	199·0	2·6	2·7	233/10	216/4	2/1	4/3	16/6	30/6
	Randfontein	6	3,150	3·2	166	8·6	13·6	49	46	258	273	1,718	1,833	35/11	30/4	227·5	236·3	2·6	2·6	271/1	235/3	L2/8	1/6	L20/8	11/8
Union Corporation	East Geduld	6	11,500	5·7	291	2·6	3·0	63	40	311	249	796	806	31/8	29/9	244·7	241·8	6·1	6·0	102/11	99/-	44/9	44/7	145/8	148/5
	Geduld Prop.	6	2,500	3·4	180	5·0	5·9	7	30	257	211	543	571	35/-	32/5	88·5	89·9	3·3	3·1	214/8	206/1	5/7	6/10	34/2	4:/5
	Grootvlei	6	16,000	4·6	218	8·9	17·2	37	45	217	202	1,067	1,095	29/1	27/7	227·1	233·7	4·3	4·3	136/9	129/3	23/9	25/2	111/9	118/1
	Marievale	6	3,600	5·5	258	10·1	9·2	37	48	299	330	383	370	41/3	39/3	97·4	90·8	5·1	4·9	162/-	160/-	22/-	21/6	86/8	87/6
	St. Helena	6	2,000	5·3	270	9·5	13·0	63	48	446	303	471	372	42/3	43/2	103·9	74·1	4·4	4·0	191/5	216/11	12/7	6/1	57/1	30/6
	Van Dyk	6	1,300	3·7	155	10·9	11·8	24	26	217	216	469	543	42/7	38/9	81·3	87·6	3·5	3·2	245/8	240/4	6d.	1/2	2/10	7/3
Gen. Mng.	S. Roodepoort	12	1,140	4·7	226	15·9	20·6	42	35	265	263	327	324	39/10	39/8	71·2	73·7	4·3	4·5	182/8	174/7	14/1	16/8	64/11	73/5
	W. Rand††	6	7,231	3·4	170	12·6	—	56	—	298	—	1,331	—	32/5	—	174·5	—	2·6	—	246/11	—	2d.	—	1/1	—
Anglo T'vaal	*Klerksdorp*	6	187	2·5	123	2·0	1·6	33	16	184	162	67	62	32/7	32/3	8·1	8·4	2·4	2·7	269/2	237/2	L2/7	1/4	L21/2	9/9
	Rand Leases	12	4,971	4·2	178	29·8	37·0	48	34	253	251	1,985	2,041	39/11	38/1	338·9	346·3	3·4	3·4	234/2	224/9	2/4	4/-	13/9	24/9
	Village M.R.	12	—	—	—	—	—	—	—	—	—	410	405	31/1	30/6	62·7	63·2	3·0	3·1	203/2	196/-	6/11	8/3	45/2	52/8
Str'more	*Ellaton*	12	414	9·1	428	8·0	—	93	—	436	—	155	—	45/7	—	42·6	—	5·5	—	165/6	—	23/-	—	82/11	—
	Stilfontein	6	2,270	7·5	270	9·4	9·1	80	80	365	337	484	367	45/-	42/10	159·3	103·4	6·5	5·6	136/9	152/1	36/10	26/11	112/-	95/7
Others	N.Kleinfontein	6	2,945	3·2	152	12·6	15·0	35	44	190	218	643	634	28/2	27/1	80·2	82·2	2·5	2·6	221/5	208/10	2/11	5/1	22/7	39/-
	Spaarwater	6	150	6·2	230	5·2	6·9	39	42	304	362	64	63	62/2	61/7	15·9	14·1	5·0	4·5	250/5	275/11	L6d.	L6/5	L2/-	L 28/7
	Nigel Gold	6	287	5·0	154	10·3	10·1	27	24	189	151	165	190	40/6	37/5	25·4	27·4	3·1	2·9	264/-	257/2	L9d.	L4d.	L5/-	L2/4
	W. Nigel	12	746	4·6	170	12·4	11·2	33	38	276	237	207	202	46/5	47/8	46·5	45·7	4·5	4·5	206/6	211/-	9/4	8/6	41/9	37/4

** Includes sundry revenue less sundry expenses ‡‡ Calculated on net profit after tax † Including uranium cap. exp. * Calculated on stoping width
§§ After Defd. shares' participation x Also Loan Capital and/or loans other than uranium *Italics:* Scheduled uranium producers L indicates loss
‡ Profit figures take into account £15,469 from sale of Copper/Gold concentrates †† 1953 figures not comparable a Also 25,000 Defd. shares (£1) which take first 25 per cent of distributable profits

COMPANY NEWS AND VIEWS

Mining Tax Concession Prospects in Forthcoming Australian Budget

Measures to attract overseas investment in the production of Australian minerals, particularly uranium, are being considered with a view to incorporation in the Federal budget to be presented on August 18 next, according to a report appearing in a recent issue of the *Financial Times*.

Formerly, overseas investment in uranium mining was hampered by policies limiting tax concessions to companies or groups, employing an overwhelming proportion of domestic capital. But it now appears that submissions have been made to the Australian Government to ensure that companies recoup their total capital expenditure on mine development, plant and housing over the first five years of production. In North Australia company interests are pressing for a tax free minimum period of 10 years during which time 60 per cent of the profits would be tax-free and the balance tax-free if expended on prospecting, exploration, research, or new mineral developments endorsed by the Commonwealth Bureau of Mineral Resources and the State mine department.

Currently, income uranium mine operations is exempt from taxation but this concession applies only to resident companies having at least 75 per cent of their share capital owned in Australia, and the Government is being urged to remove this restriction against non-resident capital. Tax exemption applies only until 1960 and the Government has been asked to extend the period.

At present the general concensus of opinion is that the forthcoming budget will grant general income tax concessions worth about £45,000,000 in a full year and up to £30,000,000 in the current year.

Rand and O.F.S. July Returns

The general expansion in profits of the newer mines provides the feature of the July returns from the South African gold mines. President Steyn increased its working profit to £30,009 against £17,328, reflecting a mill throughput 5,500 tons greater at 47,000 tons than in June. Western Holdings, also in the Anglo American Corporation of South Africa group, raised its working profit to £85,024 (£67,671), the better result being the end product of larger crushings and lowered working costs. Welkom, in the same group, showed profits of £10,025 (£8,021), and a reduction in working costs per ton milled from 47s. 8d. to 46s. 3d. St. Helena in the Union Corporation group continued its upward course by milling 91,000 tons (84,000 tons), and reported profits increased to £60,564 against £53,525.

The new Freddies Consolidated property again showed a working loss, this time estimated at £23,351 against £27,044 in June.

In the Strathmore Consolidated group—soon to be merged with General Mining—Ellaton and Stilfontein both reported higher operating profits, Doornfontein, in the Gold Fields group, showed up well, working profits reaching the record figure of £77,921.

Other good returns were made by East Geduld, Grootvlei, Blyvooruitzicht, East Rand Prop., and Nigel.

Randfontein, the big gold/uranium producer announced profits of £45,099 against £38,339.

Our usual statistical table for the Rand and O.F.S. producers will appear in next week's issue.

Chibuluma to Erect Cobalt Treatment Plant

Chibuluma Mines Ltd. have announced their intention to construct a cobalt treatment plant in the near future at Ndola. The site selected is adjacent to that on which Ndola Copper Refineries are to construct an electrolytic copper refinery.

The cobalt treatment plant will be owned by Chibuluma Mines Ltd. and will treat the cobalt output of the Chibuluma Mine. Treatment will take the form of a three-stage process. The first stage, which it is expected will come into operation in 1956, consists of the electric smelting of Chibuluma's cobalt-rich concentrate to produce a matte containing cobalt and copper. The second stage, which will follow later, involves the production of cobalt oxide, and eventually the third stage will produce cobalt metal. The total cost of the plant is expected to be in the region of £500,000. Electric power for the plant will be provided by the Rhodesia Congo Border Power Corporation.

Geevor Reduces Distribution

Geevor Tin Mines, the Cornish tin producer, in a preliminary profit statement covering the year ended March 31, 1954, announced a reduction in its dividend rate from 45 per cent to 35 per cent, or 1s. 9d. per 5s. unit against 2s. 3d. in the preceding year.

Untaxed profits slumped from £115,462 to £53,074. Taxation took £16,466 (£70,655); the dividend distribution absorbed a net £19,866 (£25,155); the sum of £10,000 (£19,727) was allocated to general reserve; and the forward balance was £10,840 compared with £9,555 brought in. Mr. G. W. Simms is chairman. Meeting, London, September 8. Dividend payable to members registered August 16.

Some Anglo-Oriental Companies' Results

Five companies in the Anglo-Oriental (Malaya) group of tin companies have now published their results for the year ended March 31, 1954.

Company and Issued Capital	*Year to Mar. 31*	*Output Tons Metal*	*Price Received Per Ton Metal*	*Dividend*	*Forward Balance*
			£	*s. d.*	£
Rawang Conc. ...	1954	526	641	8 0	192,197
£200,000 (£1) ...	1953	575	931	15 0	180,802
	1952	545	934	15 0	176,870
Rawang Tinfields ..	1954	294	668	1 6	97,977
£876,003 (10s.) ...	1953	602	933	2 6	88,511
	1952	866	929	2 6	117,205
Kampong Lanjut ..	1954	133	645	Nil	76,091
£300,000 (£1) ...	1953	226	931	2 0	75,431
	1952	340	918	3 0	64,565
Kramat Tin Dred.	1954	Nil	Nil	Nil	117,250
£165,000 (5s.) ...	1953	108	944	1 0	111,115
	1952	256	924	2 9	92,455
Kuala Kampar Tin	1954	1,432	643	4 6	630,588
£615,000 (10s.) ...	1953	1,659	933	12 0	593,317
	1952	1,544	941	11 0	567,596

Note.—Output and price to nearest ton or £.

Broadly speaking, the results summarized in the table above tell their own story—declining price for tin, lower outputs, reduced dividends, and slightly increased forward balances.

Mr. D. T. Waring, who is chairman of these Malayan incorporated companies, does not enclose his annual statement with the report and accounts, so that comment on the company's activities during the year will have to await the annual meetings, all of which will be held on August 12 at Kuala Lumpar.

Lower Perak Tin Dredging, is in the same group and has the same chairman, but its financial year ended April 30, 1954. During the year this company produced 1,136 tons metallic tin (995 tons) and obtained an average price of £644 per ton metal against £917 per ton metal in the preceding year. Total distribution to shareholders was reduced to 1s. 4.8d. per 4s. share against 2s. paid on the £660,000 issued capital a year ago. The forward balance at the end of April last stood at £311.701 against £288,731 brought in.

Esperanza's Treatment Plant Now Completed

Esperanza Copper and Sulphur, in a progress report covering the period ended June 30, 1954, states that the new treatment plant has been completed and is expected to commence operations at the beginning of this month. Unfortunately, further testing of the wells, which had been drilled to provide water for the new treatment plant, has revealed that the present supply would not be sufficient to enable the mill to operate at full capacity. Steps to rectify this position have been taken with satisfactory results and ample supplies of water should be assured for some years from another source so soon as the necessary pumps and piping have been installed. This work, it is estimated, will be completed inside of three months.

In view of the delay the progress report states that revenue from the Limni section will be considerably affected up to the end of this year.

On the other hand, the mining and shipping of ore from the Kinousa Mine is continuing and the ancillary treatment plant has been operating satisfactorily.

Three boreholes, completed in the Evloimeni area did not reach a commercial ore-body, but a fourth borehole recently intersected high grade sulphide ore at 200 ft. At this depth the rig had to be released to deal with the pressing matter of finding more water for the mill. The report adds that drilling in this area will be resumed during the current month.

Silvermines Lead and Zinc Obtain £120,000 Loan

Silvermines Lead and Zinc Co., has announced that the Ministry for Industry and Commerce, Eire, has agreed to issue a trade loan to the company of up to a maximum amount of £120,000 repayable in instalments within five years. Silvermines is proposing to reorganize its capital structure by reducing its capital from £450,000 to £275,000 by writing off 6d. per share of the £7,000,000 issued 1s. shares, thereafter the new 6d. shares will be consolidated so as to constitute 1s. shares. Once the Court has sanctioned the scheme the authorized capital will be increased to £450,000 in 1s. shares. To pay off loans obtained from its directors, the company is also issuing £150,000 5½ per cent Convertible Loan Stock and the balance of this issue will be allocated to shareholders after the reduction of capital. The Loan Stock is to be repaid on December 31, 1960, at par.

Wankie's Good Recovery

Wankie Colliery's coal output for June at 210,042 tons has not been bettered since last January when 215,502 tons were produced. The June figure is most encouraging and represents substantial recovery from the February low of 177,234 tons. The improvement may be expected to be maintained, as an official statement released earlier this month said that the faults which had been hampering production had now been overcome and that full production has been restored.

Indeed, as we go to press the July output figures for Wankie show that a total of 226,256 tons were produced, which is the best monthly output figure recorded since August, 1953. Coke production also showed an advance over the June figure and rose to 13,075 tons.

COAL OUTPUTS FOR JUNE

Company	June (in tons)	Months Since Year End	Cumulative Totals (in tons)	
			This year to date	Last year to date
Amal. Coll. of S.A.	577,906	6	3,419,040	3,722,874
Apex	83,415	6	476,915	496,634
Blesbok	46,229	6	273,146	311,103
Coronation	84,927	6	520,755	556,238
Dundee	28,710	6	194,482	220,599
Natal Navigation	98,688	12	1,286,578	1,386,598
New Clydesdale	70,295	12	856,391	563,208
New Largo	88,252	6	456,904	250,862
S.A. Coal Est.	139,257	12	1,639,616	1,660,591
Springbok	68,687	6	411,382	451,559
Transvaal & Delagoa	110,074	10	1,184,840	—
Van Dyks Drift	48,110	6	392,015	304,597
Vierfontein	81,630	6	429,398	53,605
Vryheid Cor.	44,034	6	250,693	251,517
Vryheid Cor.*	36,081	6	210,047	218,740
Wankie Coll.	210,042	10	2,007,638	2,004,697
Wankie Coll.*	11,699	10	116,472	120,685
Witbank	139,257	6	796,213	766,924

* Coke

Oil Returns—June

Trinidad Leaseholds, whose June production figure was well up to standard, shows a useful expansion in production for the current year compared with that achieved during the year ended June 30, 1953. Ultramar, at the halfway mark, is more than holding its own, as indeed are all the companies listed in the table below with the exception of Kern Oilfields whose June output is the first recording for the current year and therefore cannot be taken to be indicative of what is to come.

OIL OUTPUTS FOR JUNE

Company	June (in tons)	Months Since Year End	Cumulative Totals (in tons)	
			This year to date	Last year to date
Anglo Ecuadorian	27,027	3	80,602	78,331
Apex Trinidad	36,951	9	334,798	333,538
Attock Oil	46,347*	6	89,807	80,893
Kern Oilfields	26,719	1	26,719	27,780
Lobitos Oil	41,461	6	245,481	223,567
Trinidad Central	8,813	6	53,005	47,021
Trinidad Leaseholds	76,180	12	907,896	883,753
Trinidad Petroleum	39,507	11	434,086	449,174

Note—1 ton taken to equal seven barrels.
* June quarter

HENDERSON'S TRANSVAAL ESTATES LIMITED

The Forty-Second Annual General Meeting of the Company was held at 20 Aldermanbury, London, E.C.2, on Wednesday last.

Sir Joseph Ball, K.B.E. (Chairman), who presided, in the course of his speech said :

Dealing first with the Company's own accounts, the profits, after payment of tax, amounted to £45,689 as compared with £46,704 during the previous year—a decrease of approximately £1,000. Profits before tax amounted to £73,276 as compared with £86,158 last year, the decrease of some £13,000 being due partly to a reduction of £6,800 in dividends received from Subsidiaries, and partly to a decrease of approximately £4,100 in profits on share dealing transactions; but as a set-off against this decline in gross profits, there is a reduction in taxation of approximately £12,000.

With regard to the decline in profit on share transactions, it is probably unnecessary for me to remind shareholders, once again, that these are dependent upon market conditions, and that they normally show substantial variations from year to year.

Tweefontein United Collieries Limited. This Company's South African coal interests are held through its subsidiary—Tweenfontein United Collieries Ltd.—and shareholders will probably regard as satisfactory the fact that the accounts of the latter Company for the year ended December 31, 1953, show a profit on coal of £169,500, an increase of £1,500 on the figures for the preceding year.

Coal sales, however, at 1,279,600 tons show a decrease of 37,600 tons during the same period, the decrease being due partly to transport difficulties, and partly to a shortage of labour for loading. I am glad to say that this labour shortage has now been remedied, and that some improvement is also manifest in the transport situation.

Last year I mentioned that boring west of the Tweefontein plant had proved that the No. 2 Seam underlies this area, and that its thickness and calorific value are satisfactory. It is anticipated that the exploitation of coal from this seam through the new No. 3 Incline Shaft will commence by the end of this year.

A successful test carried out on the No. 1 Seam lying below the Main Seam at the bottom of the Waterpan shaft has justified the installation of haulage equipment to work the seam from the shaft bottom. Satisfactory progress has been made in opening up this seam, and an average of 250 tons per shift is being produced from this new source of supply. Our latest information is that the seam is developing well, and that it will make a useful contribution to the daily output.

White's South African Portland Cement Company Ltd. This Company, in which we hold a very substantial investment, enjoyed another successful year. For the twelve months ended November 30, 1953, the total deliveries again amounted to 519,000 tons, of which 376,000 tons came from the Lichtenburg factory, and 143,000 tons from the old White's factory. The net profits before tax showed an increase of approximately £12,000, but the net profit after payment of tax amounted to £390,000, the same as that for the preceding year.

A contract has recently been entered into for prospecting on the farm Kameeldoorn No. 66 in the Middleburg District, where asbestos is being tributed on a royalty basis. In the event of the deposits proving sufficiently extensive to justify the flotation of a separate company to work them, we shall, as vendors, obtain a controlling interest therein.

The mineral rights are held by our wholly-owned subsidiary—Mineral Holdings Limited—which company is also interested in the drilling programme now in progress in the Bethel-Standerton district of the Transvaal, a large area of its mineral rights in this district having been included in prospecting option agreements with subsidiaries of two of the principal mining finance houses, viz., the Consolidated Gold Fields of South Africa Ltd., and Union Corporation Ltd., who are embarking upon an extensive programme of drilling for gold over a wide area. It will be appreciated that, in view of the nature and extent of this work, it may not be possible for some time to come to make an accurate assessment of these enterprises.

The future of farm Vryheid 779, is still uncertain. Shareholders will recall that the Board had decided, instead of embarking upon a programme of shaft-sinking, driving and crosscutting estimated at that time to cost some £53,000, to await the results of the exploratory work then about to be undertaken by the Messina Company upon their property immediately adjacent and west of Vryheid. This work has, unfortunately from our point of view, been somewhat delayed, owing to the heavy commitments of the Messina Company, and the results are not likely to be available for some time to come.

The report and accounts were adopted.

BISICHI TIN (NIGERIA)

The forty-third annual general meeting of the Bisichi Tin Co. (Nigeria) Ltd., was held on July 29 in London.

Mr. O. V. G. Hoare, Chairman of the Company, presided.

The following is an extract from his Statement circulated with the report and accounts for the year ended December 31, 1953:

During the year under review revenue from the sale of Tin and Columbite aggregated £725,680. This is £84,412 higher than the previous year's figure. The gross profit before Taxation is £360,063 as compared with £270,670 gross profit last year. The Taxation liability is estimated at £236,500.

The net profit available for distribution is £123,563 to which must be added £57,206 credit balance brought forward from previous years. An interim dividend of 10 per cent (3d. per share) was paid in July last and your Board now recommend the payment of a final dividend for the year under review of 30 per cent (9d. per share), making a total distribution of 40 per cent for the year under review. The credit balance carried forward on Profit and Loss Account will be £79,569.

We have entered into contracts in conjunction with our Associated Companies for the sale of the whole of our Columbite production to the end of 1956. For the current year we are to receive £2,180 per s.ton of 73 per cent metal and for 1955/56 £2,107 per s.ton of 73 per cent metal.

The General Manager states that 538 tons of Tin were produced, 18 tons less than last year, but the Columbite output went up from 174 s.tons to 209 s.tons.

At December 31, 1953, Tin reserves were proved at 4,121 tons and Columbite 988 tons. Much important work was done with regard to dams, water and earth works and the plant and equipment was well maintained.

For the five months to the end of May, 1954, 233 l.tons of Tin and 96 s.tons of Columbite have been produced and the estimated profit, before deducting Depreciation and Taxation, is approximately £170,000.

The capacity of the Treatment and Dressing Plant is being considerably enlarged and much new equipment is being installed. This plant, in addition to treating ores from Bisichi areas, also treats the ores mined from the Gold and Base Company's properties. With these results before them the Directors have declared an interim dividend of 10 per cent (3d. per Share), less Tax, on account of the current year.

The report and accounts were adopted.

EX-LANDS NIGERIA

The forty-second annual general meeting of Ex-Lands Nigeria Ltd. was held on July 29 in London.

Major General W. W. Richards, C.B., C.B.E., M.C., Chairman of the Company, presided, and the following is an extract from his Statement circulated with the report and Accounts for the year ended December 31, 1953:

Although we produced more Tin last year, 646 tons, compared with 620 tons the previous year, Revenue at £319,045 was down by over £113,000, due entirely to the fall in the price of Tin.

Last year I warned Shareholders that, due to the fall in the price of Tin, we considered it imprudent to make an interim distribution before an accurate assessment of the financial results of the year's operations could be made.

We are now able to propose a distribution for the year of 20 per cent, equal to 4.8d. per Unit of Stock. The Dividend is being paid on the Issued Capital to-day, i.e. £270,128 which includes the conversion of Notes made before June 17, 1954.

The ore reserves at December 31, 1953, are proved at 5,159 tons Tin concentrates. This figure includes 858 tons for the recently-acquired Dress areas. Of the 646 tons mined during the year under review, only 313 tons were taken from the proved ore reserves.

For the first five months of the current year, i.e. January to May inclusive, 292 tons concentrates have been produced compared with 271 tons for the corresponding period of the last year. The approximate profit for this period (subject to depreciation and tax) is £50,000.

The Chairman, addressing the meeting, said:

Our London Consultant visited our properties last month and he reports production of tin in the first six months of the year has been retarded owing to mechanical failure of the large Monighan Dragline excavator. The replacement part has now arrived on the property and it is expected that this Unit will be producing in September.

Wet stripping in Yelwa Area is proceeding to plan.

The Dress Area recently acquired from an associate company, is being opened up and two paddocks are in operation. A number of hand-paddocks are being worked.

All the Ex-Lands' Areas are fortunate in having abundant water, and costs are low as a result.

The ore reserve position is very satisfactory, and prospecting work is continuing.

The report and accounts were adopted.

KAY TIN MINES (KINTA) LIMITED

IMPROVED POSITION

MR. C. A. BOLTON'S SPEECH

The Annual General Meeting of Kay Tin Mines (Kinta) Limited, was held on July 30 at Winchester House, Old Broad Street, London, E.C., **Mr. C. A. Bolton,** Chairman of the Company, presiding.

The Chairman said : Gentlemen, you have had before you for some time the Directors' Report and Accounts for the year ended December 31, 1953. The accounts are very similar to those of the previous year except that we have been able to carry forward a very small profit instead of a loss.

The main occupation of your Board during 1953 was dealing with the computation of the accounts regarding the war damage done by the invading Japanese and the settlements of the War Damage Claim.

The Company was able to get compensation for certain plant and machinery amounting in all to £7,326 18s. which represents 90.4 per cent of the total amount of the award made to the Company.

The mines were not very active during the months of January to April, when tin prices were showing a rapid decline from the extremely high figure obtainable during the previous year. During seven months to December, 1953, we recovered 421.31 piculs, or approximately 25 tons of tin concentrates, this realized $101,756, which at the exchange rate of 2s. 4d. equalled £11,871.

It has not been possible for the Company itself to work the property, owing to financial reasons and it is only this year that we have been able to get the compensation settlement amounting to approximately £7,500.

An effort is being made to secure a lease on a property some miles from Kay Tin, which the Company has prospected before the war but our prospecting licence lapsed and we have now made application for its renewal. The Board is paying close attention to this matter and should we be advised that the area is safe for working and we obtain a licence we shall spare no effort to carry out extensive drilling operations.

Production during January to June amounted to 176.76 piculs or 10½ tons, which sold for the equivalent of £4,202, of which our proportion was 10 per cent or £420. The contractors inform us that during the past two months they have been transferring their sluicing plant to another area, and we are expecting to receive a cablegram from them stating that the work is finished and that they have restarted production.

The Reports and Accounts were unanimously adopted; the retiring director, Mr. Alfred T. Barnes was re-elected and the remuneration of the auditors, Messrs. Callingham, Brown & Co., was fixed.

Obituary

MALCOLM BURR

We regret to learn of the death in Istanbul recently of Dr. Malcolm Burr at the age of 76. Dr. Burr took his associateship at the Royal School of Mines and became well known as a geologist besides being prominent as an entomologist and a prolific writer on many aspects of the kaleidoscopic life of the Middle East and Asia. He served in the Salonika Army in the First World War and commanded the 1st Serbian Battalion in the Second World War he worked for the Foreign Office and Ministry of Information in Yugoslavia and Turkey with which latter country he became increasingly associated eventually making his home in Istanbul.

Dr. Burr's chief claim to fame at any rate among mining engineers and geologists is in the development of the Kent coalfields where he served as geological adviser to the Kent Coal Concessions from 1908 to 1914. The Kent coalfield owed its discovery and early development mainly to the work of his father, Mr. Arthur Burr, who fought so strenuously for the theory that the Pas de Calais field would be found to extend under the Channel into Eastern Kent and which his son's geological experience did much to prove. The name of Burr will always be intimately linked with the history of the Kent coalfield.—*Si monumentum requiris, circumsqué.*

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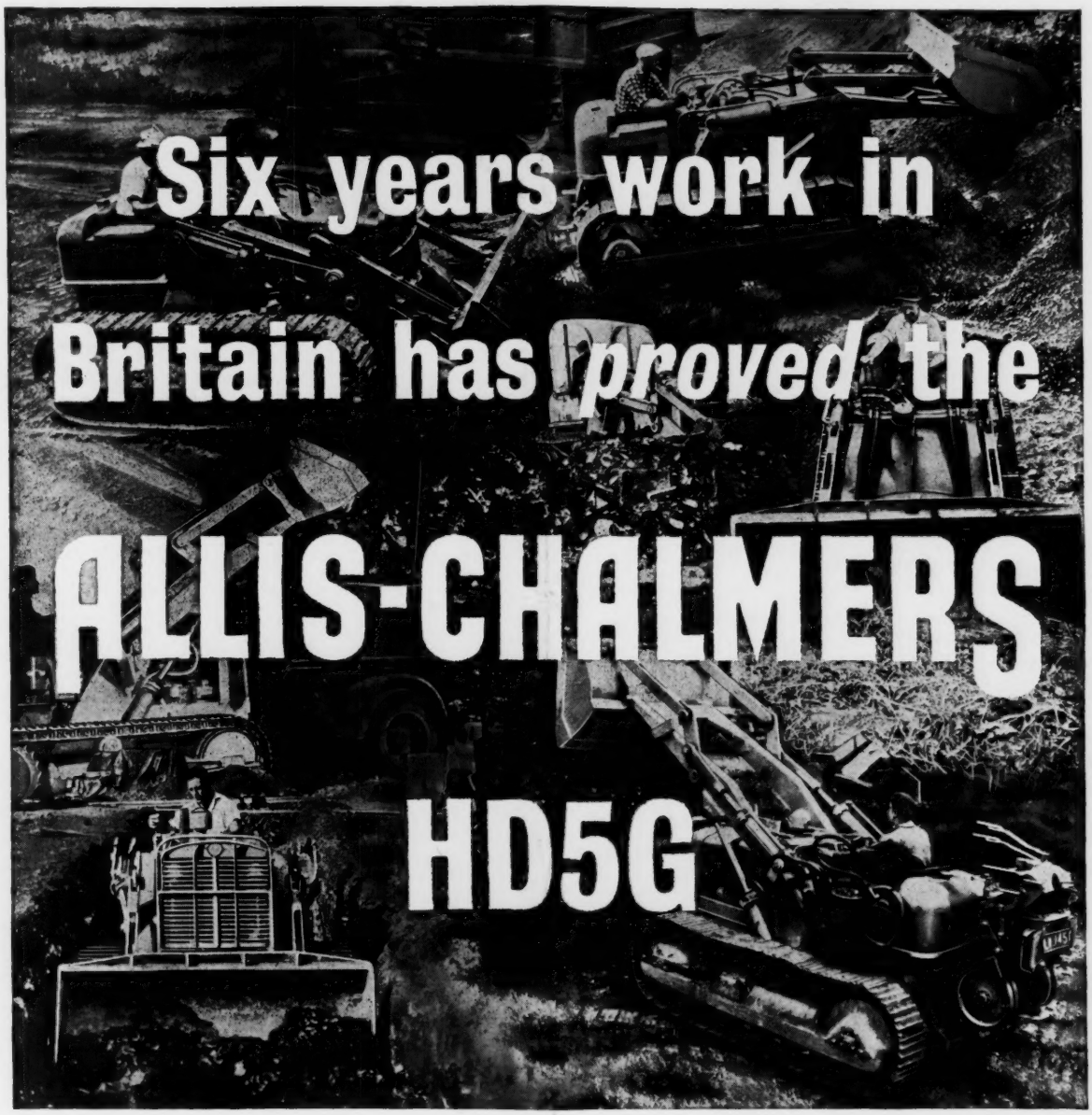

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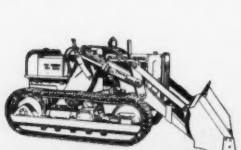

HD-5G *Bucket capacity :*
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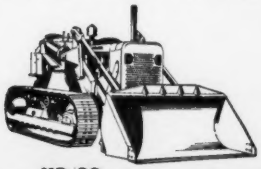

HD-9G *Bucket capacity :*
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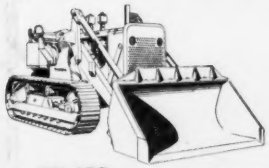

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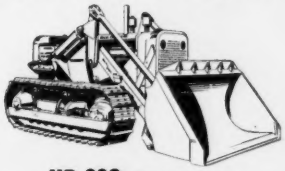

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